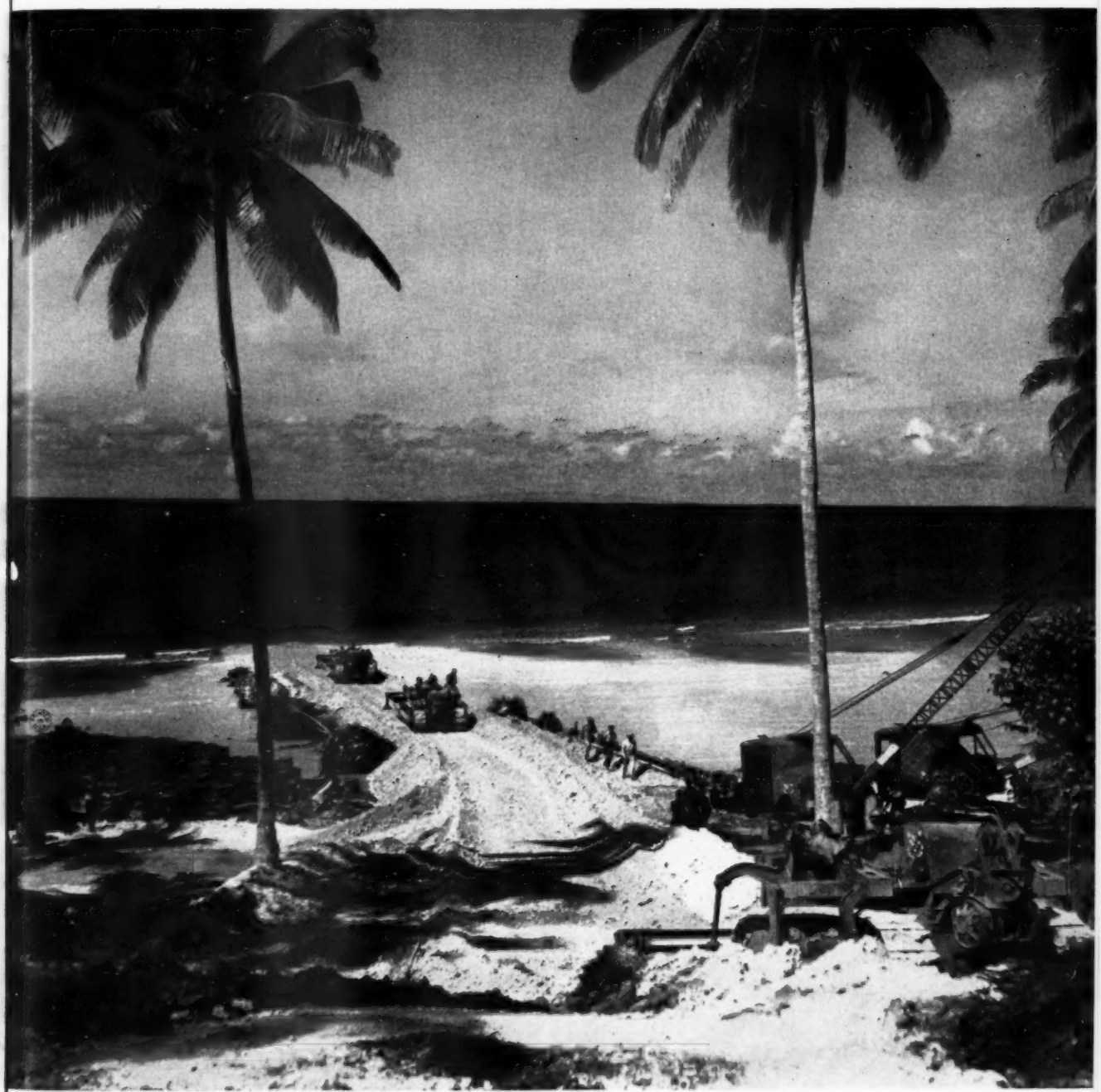
EXCAVATING ENGINEER

FOUNDED 1905



It's So Peaceful — Now. Seabees use Bullgraders to clear a road to the site of a dock that will be built on Emirau Island to facilitate the unloading of LST's. Cranes are ready to help in construction of the dock.

Official U. S. Marine Corps Photo

Vol. XXXVIII July, 1944 Number 7

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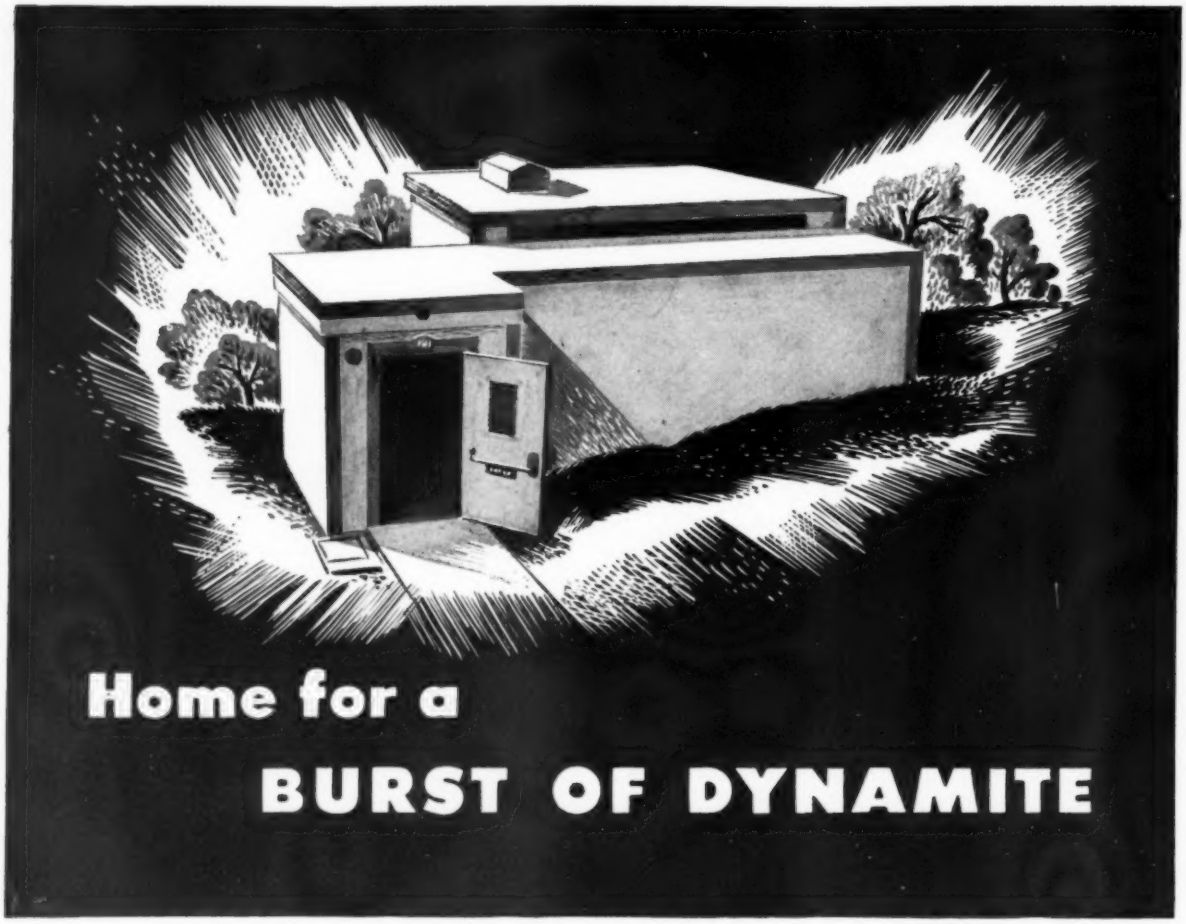

Home for a BURST OF DYNAMITE

THIS BOMB-PROOF SHELTER is radically different from those on the war front. Here the "bombs" explode inside—set off by a remote control electric firing panel. A part of the hook-up is oscillographic equipment which permits the recording of firing times of various types of explosives.

Such experimental work, combined with field experience, contributes to the tremendous fund of knowledge which Hercules has accumulated over the years and is constantly enlarging for the benefit of the users of Hercules explosives everywhere.

HERCULES EXPLOSIVES

HERCULES POWDER COMPANY
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For more efficient drilling

use JACKBITS

Only Ingersoll-Rand Jackbits cover a complete range of sizes from 1⅜ to 4½ inches. Included in this group are special bits, some developed for the hardest rock . . . some for abrasive or sticky ground . . . some for ground that tends to rifle or that binds the bit . . . some for ground that requires maximum bit clearance. From the many different sizes and designs, let us help you select a bit that will give you the best drilling efficiency in your rock. On one job, for example, the drilling rate increased from 16 inches to 22 inches a minute when Jackbits were put to work.

Then, too, only Jackbits are backed by a complete line of reconditioning equipment which consists of Hotmills and Grinders for resharpening bits, a Box Tool and Die Head for the easy conversion of lathes for Jackrod threading, and numerous Furnaces and Accessory Equipment. The great degree of accuracy made possible by I-R resharpening equipment permits the use of smaller-gauge bits. This leads to surprising increases in drilling speed. Yes, you will have more efficient drilling when you use Jackbits.

COMPRESSORS • TURBO-BLOWERS • ROCK-DRILLS • AIR TOOLS
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HOW AIRFIELDS GROW ON MUCK, ON SAND, ON TUNDRA

ON world-wide battle fronts America's planes are taking off on missions against the enemy —taking off from desert sand, jungle muck, or Aleutian tundra.

In a matter of days, bulldozers shove aside the muck or level the sand. And giant cranes lay steel landing mats that are bolted into a landing strip.

Look at the engines in these bulldozers and cranes. You'll find familiar friends—the same friends that power tanks and trucks, landing barges and patrol vessels, tractors and auxiliaries—General Motors Diesels.

And in these rigorous jobs of war, a promise is being written—a promise of plentiful, dependable, easily maintained, low-cost power for America's needs in the peacetime days ahead.

Tomorrow

Reconstruction and new construction are going to need plenty of this hard-hitting, easy-on-the-fuel power. With normal refinement and development speeded up by war, with production expanded, GM Diesels will be ready to serve in more fields and in more ways than ever.

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GENERAL MOTORS
DIESEL POWER

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EXCAVATING ENGINEER

FOUNDED 1905

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Published Monthly by
THE EXCAVATING ENGINEER PUBLISHING COMPANY
South Milwaukee, Wisconsin, U. S. A.

F. O. WYSE, Publisher — J. D. GRACE, Associate Editor
D. B. REED, JR., Managing Editor — E. W. ARNDT, Art Editor
E. M. HEUSTON, Sales Manager

CCA Member Controlled Circulation Audit

Regular Subscription (payable in advance): 25 cents per copy, $2.50 a year: Canada and foreign, subject to publication policy, $3.50 per year. Special subscription: Upon written request on company letterhead this publication will be sent (not regularly) free of charge to companies, executives and supervisors engaged actively in excavating.

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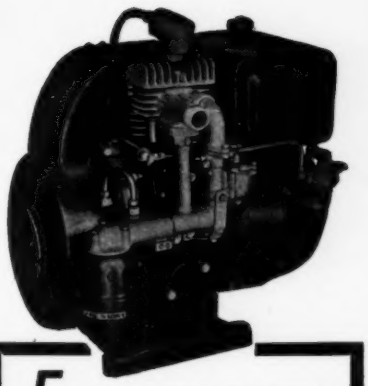

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For a dependable source of electricity on projects remote from commercial power, Onan Electric Plants are proven leaders in the field. More than half of the armed Forces' total requirements for Power Plants are built by Onan.

Gasoline-driven . . . Single-unit, compact design . . . Sturdy construction . . . Suitable for mobile, stationary or emergency service.

Over 65 models, ranging in sizes from 350 to 35,000 watts. 50 to 800 cycles, 115 to 660 volts, A.C.—6 to 4000 volts, D.C.—Also dual A.C.-D.C. output types.

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TOO LATE

Save a Life

Make an Appointment Now with Your Local
RED CROSS
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ROCK OR DIRT DUMPED *Instantaneously*

MORE TRIPS PER HOUR

Time saved on the fill is time saved for every trip . . . more trips per hour . . . more production per shift. The Koehring Dumptor dumps any type material *instantaneously*. Seconds saved over mechanical dumping method speeds up every hauling and dumping job. Rock or dirt is dumped equally fast and the load is dumped clean every time . . . ready for a full load every trip.

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KOEHRING K HEAVY DUTY

ARMY E NAVY

HEAVY-DUTY CONSTRUCTION EQUIPMENT

Which of these Wire Ropes Would You Use?

Years ago wire rope was not the highly specialized product it is today, nor was there as much use for wire rope or so many *different* uses.

Because of the many kinds of equipment using wire rope, plus the many and varied applications of that equipment, many sizes, grades, and constructions of wire rope must be made.

This makes it difficult for wire rope users to select the correct rope.

If the equipment is used in the normal way under average conditions, the manufacturer of the equipment can and does offer suggestions as to the type of rope they believe is best.

But should the equipment be altered to suit special needs, or should conditions not be average, a different wire rope specification is usually necessary for the best service.

Many Factors Considered

In recommending the correct wire rope for your equipment, several factors need to be considered:

1. Safety Factor—This has to do with the amount of loading and whether it is steady or a shock load.

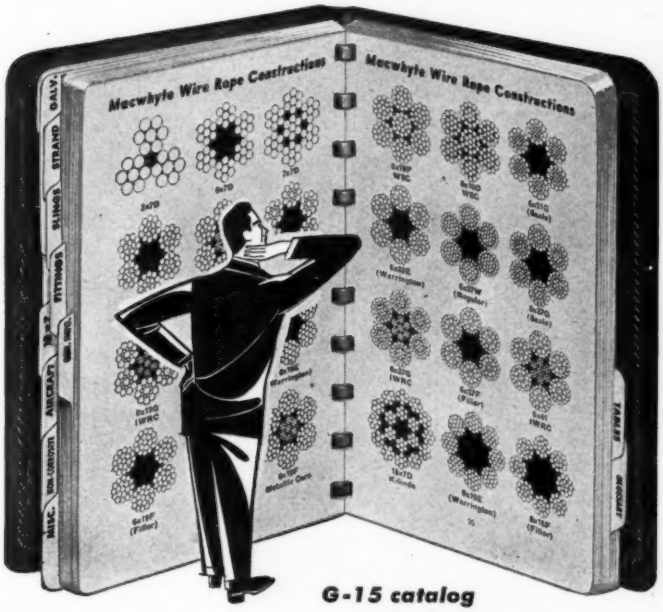
2. Bending Fatigue—This has to do with the number and size of sheaves, size of drum, and also speed of rope.

3. Abrasion.

4. Type of Equipment.

5. Use of Equipment.

Conditions of service on a given type of equipment vary so much that it is often helpful to know the type of rope previously used and the service it gave.



G-15 catalog

Then after a study of this information, wire rope can be recommended that experience proves will give the best service.

Sounds difficult, doesn't it? Really it isn't difficult when you have the advice and counsel of Macwhyte Wire Rope Engineers. Just write to Macwhyte Company, its distributors or mill depots. Tell them the make and model number of your equipment, explain briefly what it is being used for, and mention the size, grade, and construction of the rope you are now using.

Remember — Macwhyte makes the "Correct Wire Rope For Your Equipment."

Pictured above are but a few of the types of wire rope made by Macwhyte so that you may have the "Correct Rope For Your Equipment." There is a size, grade, and construction of Macwhyte Wire Rope that will give you low cost, safe service.

MACWHYTE PREformed WIRE ROPE Plus Internal Lubrication Selected Steels Tested-Proved

The correct rope for your equipment

NO. 707

MACWHYTE COMPANY

Wire Rope Manufacturers

ARMY E NAVY

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Mill Depots: New York • Pittsburgh • Chicago • Fort Worth • Portland • Seattle • San Francisco. Distributors throughout the U.S.A.

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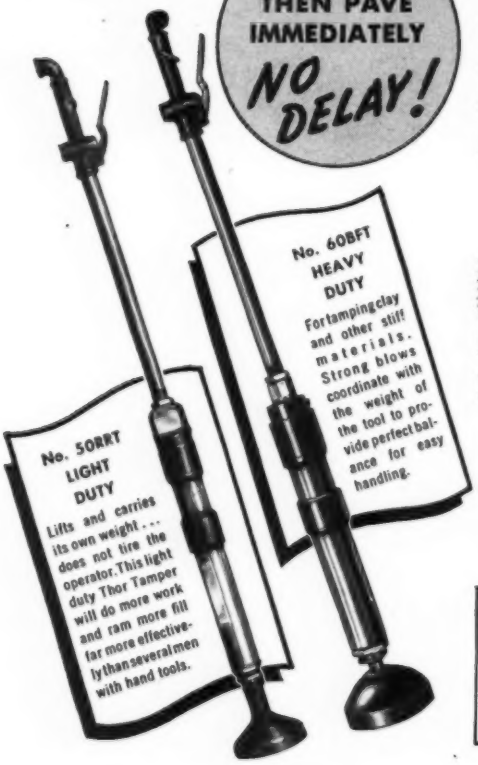
MAN! THIS TAMPER SURE HANDLES EASY AND RAMS HARD!

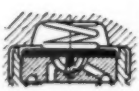
Thor BACKFILL TAMPERS

DO THE JOB QUICKER, BETTER... SAVE MONEY AND MAN HOURS!

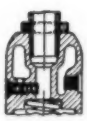
TAMP... THEN PAVE IMMEDIATELY NO DELAY!


No. 50RRT
LIGHT DUTY
Lifts and carries its own weight... does not tire the operator. This light duty Thor Tamper will do more work and ram more fill for more effectively than several men with hand tools.
No. 60BFT
HEAVY DUTY
For tamping clay and other stiff materials. Strong blows coordinate with the weight of the tool to provide perfect balance for easy handling.

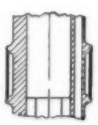
You can tamp . . . then pave *at once* when you use smooth running, rapid, powerful-hitting Thor Backfill Tampers. These Thor Tampers *ram dirt hard*—put it firmly into place *to stay!* No coming back on a job again and again to backfill, you can lay your paving immediately!



AIR ECONOMY
Simple, efficient Thor Rocker Valve is designed to utilize every ounce of air that enters the machine. Gives long service with minimum wear. Tampers develop powerful blow under 90 pounds air pressure; will operate efficiently on 65 pounds.

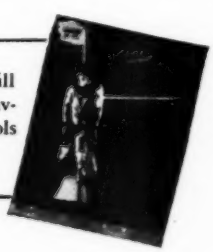


POSITIVE LUBRICATION
Automatic lubrication system keeps oil distributed throughout the tools constantly. Keeps the valve block spring functioning perfectly. Reservoir holds sufficient oil for a full day's running.



EXHAUST DEFLECTOR
Easily adjustable, simple to operate. Can be turned in any direction to blow the air down and away from the operator's legs.

FOR MORE FACTS about these *sure-hitting* Thor Backfill Tampers and the complete line of associated Thor Paving Breakers, Rock Drills, and other contractors' tools write today for Catalog 42-A.



SPECIFICATIONS

	No. 50RRT	No. 60BFT
Bore of Cylinder	1¼"	1½"
Length Overall	48¼"	49"
Weight	22 lbs.	29 lbs.
Equipment	5" Dia. Rd. Mall. Iron Butt	6" Dia. Rd. Mall. Iron Butt

Thor *Portable Pneumatic and Electric Tools*

INDEPENDENT PNEUMATIC TOOL COMPANY

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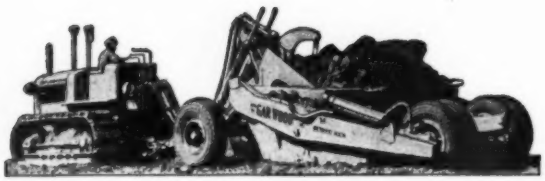
EFFICIENT for SHORT and LONG HAULS

WHETHER your contract is large or small, the hauls short or long, Euclids will do the job faster at lowest cost per yard. Their overall speed, efficiency and large capacity have cut hauling costs for hundreds of contractors and industrial users on all types of off-the-highway jobs.

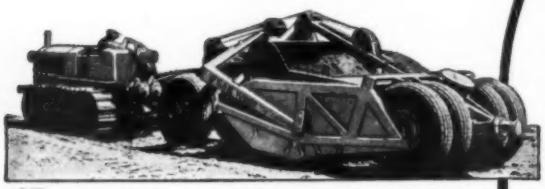
With modern loading equipment and Rear-Dump or Bottom-Dump EUCLIDS you can handle all kinds of excavation at lower cost than with other types or combinations of earth moving equipment. Check Euclid operation on any job for proof that they are efficient for all lengths of haul. Your Euclid distributor or representative is at your service to provide helpful facts and figures.

The EUCLID ROAD MACHINERY Co.
CLEVELAND 17, OHIO

EUCLID SELF-POWERED HAULING EQUIPMENT For EARTH ROCK COAL ORE



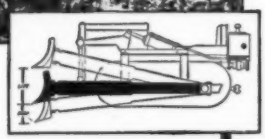
2A 4-wheel hydraulically operated Scrapers for earth moving, specifically constructed for fast digging, easy loading, accurate spreading.



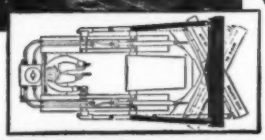
2B 4-wheel cable operated Scrapers for earth moving provide less power to load; greater clearance; flexibility for fast hauls; positive rolling ejection; precision spreading.

2C 2-wheel hydraulic Scrapers for low-cost, earth moving—dig, load, haul, back dump, make short turns.

2D Bulldozer: Blade fixed for pushing loads ahead.



2E Roadbuilders: Blade set to push loads ahead, sidecast loads to left or right.

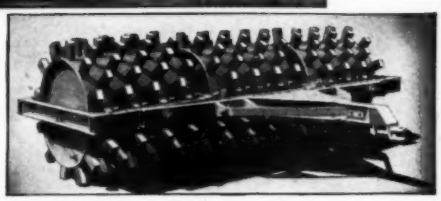


GAR WOOD Road Machinery

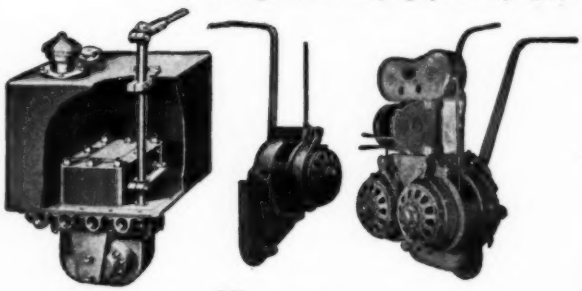
Gar Wood Industries, Inc., manufactures a complete line of heavy-duty, earth-moving machinery: two-wheel Hydraulic Scrapers in 3, 5, 6, and 8 cubic-yard capacities; four-wheel Hydraulic Scrapers in 8, 10, and 15 cubic-yard capacities; four-wheel Cable Scrapers in 11, 15, 20, and 25 cubic-yard capacities; Bulldozers; Roadbuilders; Tamping Rollers; Rippers. Accepted by leading contractors and governmental agencies throughout the world, as meeting all requirements for heavy earth-moving equipment.

Refer to picture number when ordering literature

2F Rippers rip compacted earth, shale, rock, roots, old pavements, old roads.



2G Sheep-foot Tamping Rollers built with interchangeable drums (single, double, triple).



2H Hydraulic Control Unit

2J Cable Control Single Drum.

2K Cable Control Double Drum

Hydraulic and Cable Control Units for operation of Scrapers, Bulldozers, Roadbuilders, Rippers, for heavy-duty service with track-type tractors.

GW ROAD MACHINERY is Sold Through ALLIS-CHALMERS Dealers Everywhere

ROAD MACHINERY DIVISION

GAR WOOD INDUSTRIES, Inc.

DETROIT 11, MICHIGAN

what is "RELAXED" wire rope . . . ?

Every time you run a length of non-preformed rope over a small sheave or drum, you create a high degree of bending fatigue that shortens the life of the rope.

In contrast, when you use Bethlehem Form-Set in your clamshells, derricks, cranes, and power shovels, you've got rope that's "relaxed" because it's been made by the preforming process. Form-Set Rope is flexible . . . unusually free from built-in torsional stresses.

Where it is necessary that sheave and drum ratios be small, these characteristics are especially desirable, for they mean smoother spooling, longer rope-life, smaller maintenance costs, and a lot less trouble-shooting.

Besides the Form-Set feature, you'll want Bethlehem's Purple Strand grade of rope for lifting and earth-moving work. Purple Strand is Bethlehem's top quality —made of improved plow steel—and that means it's as fine a rope as you can buy anywhere.

When you think WIRE ROPE

. . . think BETHLEHEM

Hot, Hard and Heavy

Inland Steel Company uses crawler-type excavating equipment, including three shovels and five bulldozers to dispose of over 2,000,000 cubic yards of hot slag annually at its Indiana Harbor Works.

ORDINARILY ONE DOES not associate excavating or "dirt-moving" with the operation of a steel plant. However, disposal of over 2,000,000 cubic yards of slag annually from the 36 open hearth and six blast furnaces of the Inland Steel Company's Indiana Harbor, Indiana, Works is a "dirt-moving" job of real magnitude.

Like most ordinary dirt-moving jobs, but unlike the method commonly employed by steel companies, Inland Steel Company uses crawler-type excavating equipment for slag disposal. Steel companies usually use locomotive cranes for this work. After eight years of use, Inland Steel officials state that the use of crawler-type equipment has proved successful and economical.

Along with the regular problems that would be involved in the disposal of over 2,000,000 cubic yards of material annually, Inland is faced with the additional difficulty of handling the slag when it is still almost red hot and of being limited in disposal area.

The two main plants of the Indiana Harbor Works have 36 open hearth furnaces, 24 in Plant No. 2 and 12 in Plant No. 1, and six blast furnaces. Lake Michigan is the disposal area for the slag from these 42 furnaces.

The slag disposal area for Plants No. 1 and No. 2 is a 29-foot deep bay section of Lake Michigan bounded by a shoreline approximately one and one-half miles long and a 4,000-foot long concrete revetment built across the mouth of the bay. This disposal area is being filled in from the shoreline outward toward the revetment and it is estimated that remaining space will accommodate about 11,000,000 cubic yards of material, or enough space to last about five and one-half years at the present rate of disposal. What will then be done for disposal remains a problem still to be solved, but there are several methods of solution being considered.

Slag Yard Dumps

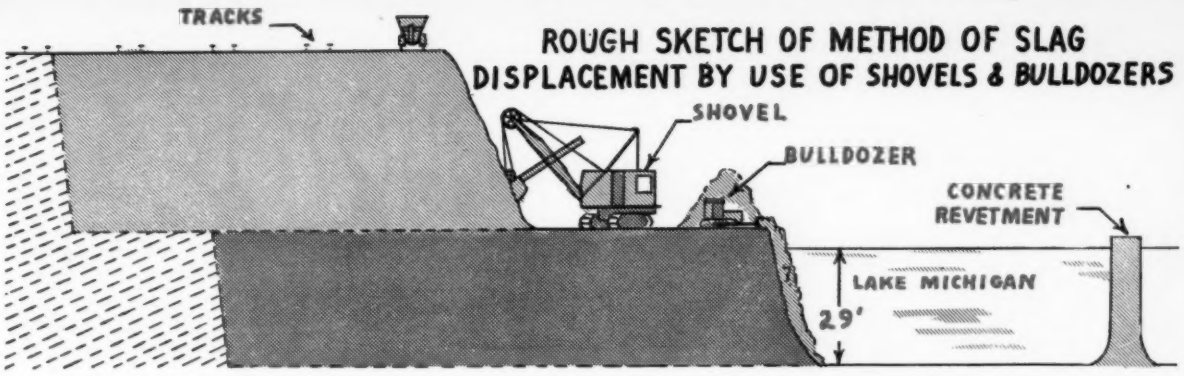
The lake-front slag yard is made up of four separate dumps—two molten slag dumps each of which takes about 1,500 feet of shoreline (used alternately), an open hearth slag dump with about 1,000 feet of shoreline and a granulated slag dump of approximately the same size as the open hearth slag dump.

Inland Steel acquired and began to use its first crawler shovel for slag disposal in 1936. This machine, a Bucyrus-Erie 48-B 2¼-cu. yd. diesel shovel was brought into the plant by a contractor who was building an extension to one of the open hearth furnaces. Inland bought this machine and after making a few changes on it put it to work on slag disposal. It proved satisfactory and so a year later another Bucyrus-Erie 48-B diesel shovel was bought and also put to work on slag disposal. A clamshell and dragline front end was purchased for one of the 48-B's for general auxiliary use.

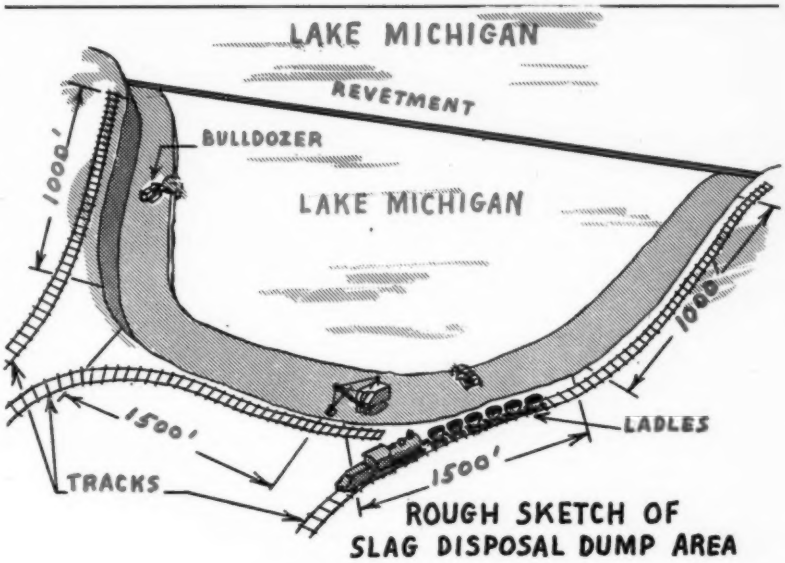
A few years later the company purchased a Bucyrus-Erie 54-B 2½-cu. yd. diesel shovel and this shovel was substituted for one of the 48-B's on slag disposal and the replaced 48-B was put to work loading limestone flux and iron ore to feed the furnaces.

In addition to the two crawler-type

● Breaking through a relatively cool top crust, the dipper of this Bucyrus-Erie 48-B 2¼-cu. yd. diesel shovel takes a bite into red hot slag hauled directly from the furnaces and dumped beside the railroad tracks near the lake front. The slag is cast into the lake.



shovels used for slag disposal at the main plant at Indiana Harbor there are three bulldozers and a Jordan spreader used as auxiliary equipment. One of these bulldozers, used on the molten and open hearth slag, is a La-Plant-Choate attached to a Caterpillar D-8 tractor and the other bulldozer used for molten and open hearth slag disposal is a LeTourneau attached to a Caterpillar D-8 tractor. A LaPlant-Choate bulldozer attached to Caterpillar D-7 tractor handles all the work at the granulated slag dump. Granulated slag is a porous cream-colored material that is formed when molten slag that comes directly from the blast furnaces is flushed into a flume of running water. This granulated slag is commonly called, "Popcorn," and weighs about 1,430 pounds a cubic yard. Molten blast furnace and open hearth slag weigh between 4,320 and 4,860 pounds per cubic yard.



Other Crawler Equipment

Other crawler - type excavating equipment used by Inland Steel in connection with their slag disposal and furnace work includes two Allis-Chalmers tractors with Baker bulldozers that are used for cleaning up holds of the ore ships that dock at the plant and for general cleanup work at the blast furnaces.

A Northwest 2½-cu. yd. shovel with clamshell and dragline attachments is used for general work around the plant and has no specific task.

The Jordan spreader, previously mentioned, is used for general cleanup work around the railroad tracks in the slag dump and for helping to shift these tracks as the dump area in use at the time fills.

There two American Hoist and Derrick Company diesel locomotive cranes equipped with generators for generating their own electric power for magnet use, six steam-type locomotive cranes of various manufacture, two diesel locomotives, Western dump cars, ladle cars and an air-compressor ladle car-dumper used at the plant. The air - compressor car-dumper is equipped with two Gardener - Denver air compressors and a Buda diesel engine.

When the open hearth furnaces are tapped the slag is flushed into ladles and the ladles are carried by an overhead crane to a pit where they are dumped. The overhead crane uses a magnet attachment to drop a heavy iron "skull cracker" ball on the slag "skulls" to break them up. The hot slag is then combed with the magnet to recover metallic material remaining in it. This metallic material is reclaimed in the open hearth furnaces. The remaining hot slag is loaded by one of the American Hoist and Derrick Company locomotive cranes into Western dump cars and the cars are

● **Working from the end of the pile and on an angle, this Caterpillar D-8 tractor and LaPlant-Choate bulldozer pushes slag cast by the shovel into the lake.**

● Still smoking, this hot blast furnace slag is cast toward the lake by a 54-B 2½-cu. yd. shovel. A ladle "skull" can be seen near the rear of the shovel.

hauled to the lake front and dumped and then displaced with the shovels and bulldozers which cast and push the material into the lake. Approximately 2,000 cubic yards of open hearth furnace slag are dumped each day of the three eight-hour turns (shifts). The shovels and bulldozers work one eight-hour turn a day, seven days a week, disposing of this and the blast furnace slag.

About 1,375 cubic yards of granulated slag from the six blast furnaces are loaded to Western dump cars and dumped at the lake front each 24-hour day. The Caterpillar D-7 tractor with LaPlant-Choate bulldozer works an eight-hour turn seven days pushing this granulated slag into the lake.

There are an average of 145 400-cubic foot ladles of molten blast furnace slag per 24-hour day delivered to the dump directly from the blast furnaces. Five runs of molten blast furnace slag are made each eight-hour turn. The ladles, on railroad trucks, are pulled to the dump area by a diesel locomotive and when they are spotted at their proper dump location the air-compressor car dumper is attached for overturning the ladles and spilling the contents. The air compressor dumper has no motive power, but is pushed by a locomotive to the desired dump location.

Two dumps are used for the molten blast furnace slag. The shovels and bulldozers are used to cast and push the slag from one dump into the lake while the slag is being dumped in the other area. Molten blast furnace slag dumps are interchanged about once every three weeks and even though the slag has stood in the open air for about 21 days it is still hot, in fact, the core of these dumps is red hot when the shovel dippers break into them to cast the material. During the period when molten blast furnace slag is being dumped on one dump the track is moved on the other dump. Tracks are shifted about 20 feet every three weeks.

One of the diesel locomotives is used for delivering all of the blast furnace granulated slag and all of the open hearth slag in approximately 12 hours each day.

The method of slag displacement for the molten and open hearth slag differs from the displacement of the granulated slag. Railroad tracks from the furnaces are laid out to the molten and open hearth furnace dumps and run on previously filled-in area parallel to water front on the Lake Michigan bay area behind the revetment built across the mouth of the bay, at present about a mile from shore at the greatest distance. The dump area on which the tracks are laid is about 30 feet above lake level and the water is 29 feet deep in the bay. The slag is dumped from the dump and ladle cars over the outer, or lake-side, of the track. The shovel is spotted below the track level on a berm running parallel to the shoreline. The shovel digs into the most recently dumped material and casts this slag over the berm into the lake and thus extends the berm outward toward the revetment wall. Material cast by the shovels that piles up on the lake line is levelled and pushed into the lake by the bulldozers. As the berm is extended into the lake more dumping space is provided on top of it and the shovels and bulldozers move outward on the newly formed berm. As the berm previously occupied by the shovels and bulldozers is raised to the height of the filled area, the tracks are moved further out toward the shoreline and a similar procedure is followed.

The Caterpillar D-7 tractor and LaPlant-Choate bulldozer handle the granulated slag without the aid of a shovel. This material is dumped from Western dump cars on tracks running on a previously filled area parallel to the shoreline. The berm to which the slag is dumped is narrower than the molten and open hearth slag dump berms. The material is, as the name granulated implies, loose and thus more easily moved by the 'dozer than the other types of slag. The bulldozer works from the ends of the dump piles and pushes the material on an angle over the edge of this berm into

● Caterpillar D-8 tractor with LaPlant-Choate bulldozer pushes into the lake blast furnace slag cast by the 54-B.

● While waiting for locomotive to spot empties and haul filled cars to the right to the furnace this Bucyrus-Erie 48-B 2¼-cu. yd. diesel shovel casts limestone flux so that larger stones will be available for loading. This same shovel loads ore for the furnaces.

the lake. In this way additional space for slag disposal is provided and the same procedure is followed outward toward the lake revetment.

The only special difficulty encountered in handling the granulated slag is experienced in extremely cold weather. This granulated slag is saturated with water from its flushing into the flume of water at the blast furnace and thus it freezes quite solid when the temperature gets below zero. However, it is reported that this is not a too serious difficulty because there are not many days a year when it gets cold enough to freeze the material too solid to be able to easily handle with the bulldozer.

There is about a mile of track used in the slag dump area and this track is shifted about 20 feet every three weeks. A power shovel and bulldozer is used to shift the tracks. The outer rail of a track section, the rail nearest the slag dump, is raised by a cable attached to the shovel dipper. After the outer rail has been raised, a bulldozer pushes the track section, rails and ties, to its new position. The bulldozer then covers the area between and near the tracks with fill and the Jordan spreader, traveling on the rails, screeds off the fill. Low spots remaining are filled by raising that section of the track with jacks and filling by manual labor. The dump crew consists of 10 men.

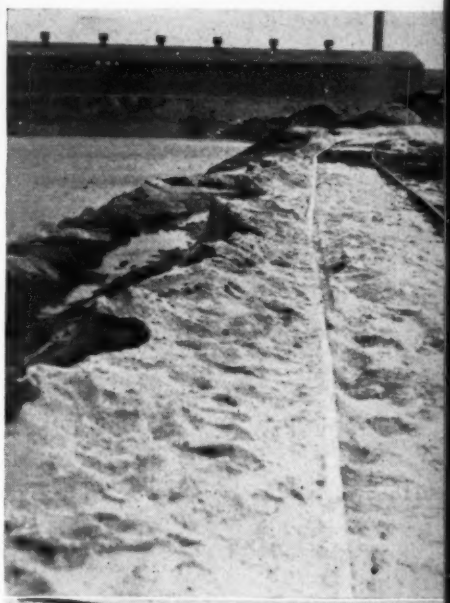
The limestone flux and ore loading operations are included under the supervision of the slag yard department of Inland Steel, as is the unloading of this material from the boats at the company's own dock.

The Bucyrus-Erie 48-B diesel used for stone and ore loading handles about 22,000 tons of stone and 20,000 tons of ore an average per month. This shovel is kept in operation an eight-hour turn each day for seven days a week. About 40 hours a week are spent loading stone and about 16 hours a week loading ore. Ore loading is sandwiched between stone loading operations.

Stone and ore is unloaded from boats at the dock to respective stock piles by a conveyor system. This stockpiling is done only during the shipping season and enough material is brought in to carry through the winter months.

The Bucyrus-Erie 2¼-cu. yd. shovel loads the stone or ore, as the case may be, into dump cars that are spotted alongside the stockpiles on railroad tracks. The dump cars are pulled to the stock yard by the same diesel locomotives that haul the slag cars and ladles to the slag dump. After hauling the cars to the stockpile the locomotive is uncoupled and is used for other work while the cars are being loaded. During loading operations the shovel works between the stockpiles and the cars and after filling a car moves the next empty one up by pushing the train of cars up

(Continued on page 388)

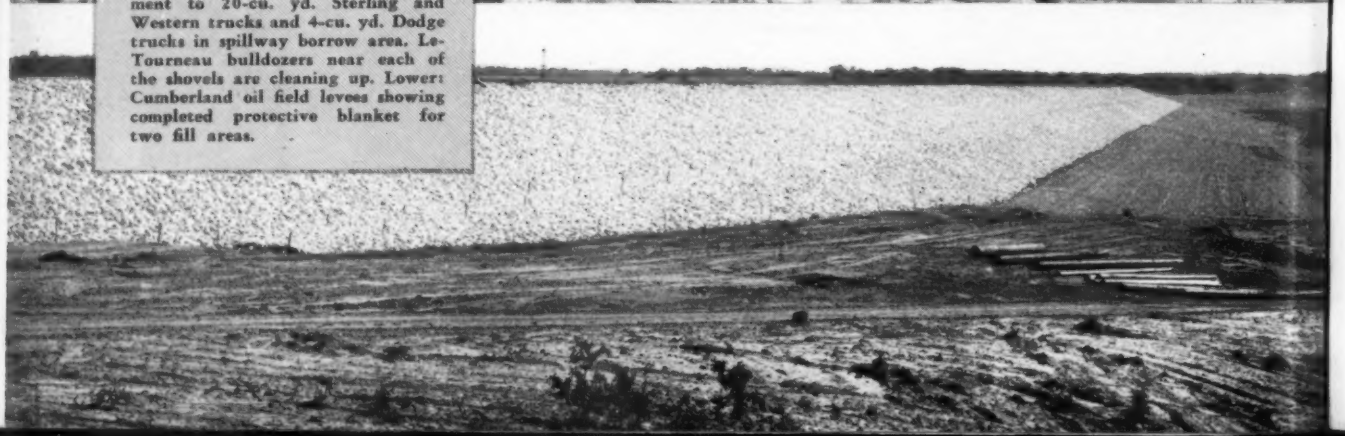


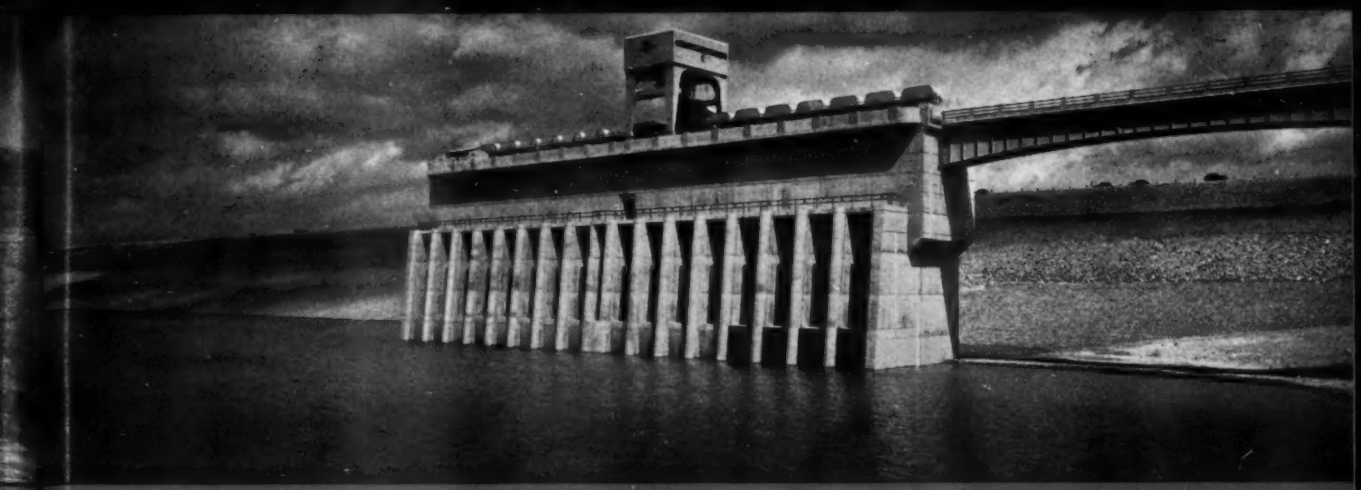
● Upper: Granulated blast furnace slag dump. Western dump cars haul this cream-colored slag and dump it beside the track from where it is pushed into the lake with a bulldozer. Center and below: Views of the Caterpillar D-7 tractor with La-Plant - Choate bulldozer pushing granulated blast furnace slag, "popcorn" into the lake.

● Artist's conception of completed Denison Dam and appurtenant structures, looking northwest. The spillway is to the left and the hydroelectric power intake structure is in the center.

Dedicate D

● Upper: Bucyrus-Erie 120-B electric shovel in lower right and Bucyrus-Erie 54-B in upper left load impervious fill for main embankment to 20-cu. yd. Sterling and Western trucks and 4-cu. yd. Dodge trucks in spillway borrow area. LeTourneau bulldozers near each of the shovels are cleaning up. Lower: Cumberland oil field levees showing completed protective blanket for two fill areas.

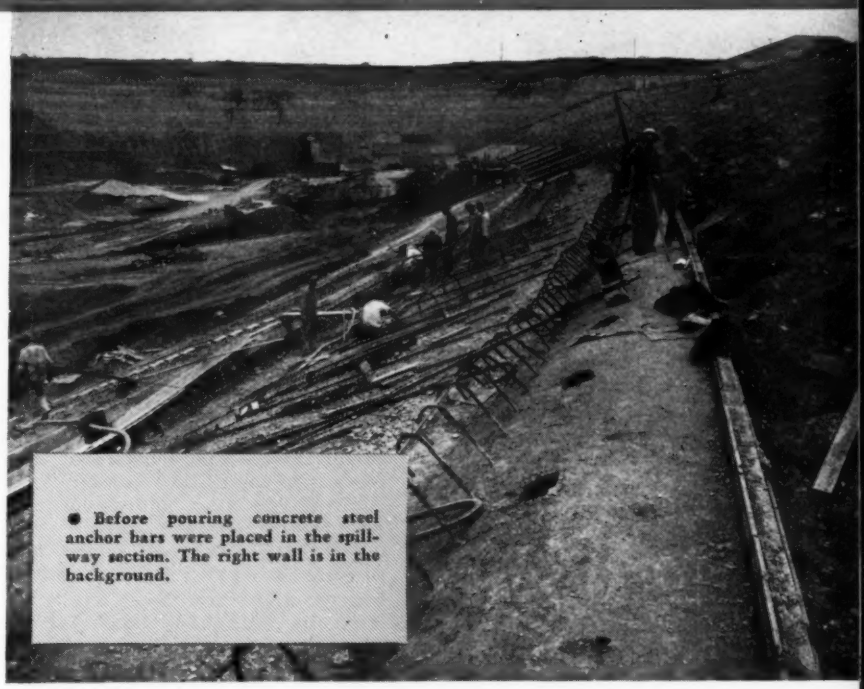




Denison Dam

● Completed dam embankment showing intake structure, looking northeast. The reservoir elevation here is 570.72.

Over 32,000,000 cubic yards of material moved in excavating the spillway and building the main embankment of the world's largest rolled-fill earthen structure.



● Before pouring concrete steel anchor bars were placed in the spillway section. The right wall is in the background.

DENISON DAM ON RED River, between Texas and Oklahoma, the largest rolled-fill earthen structure in the world, is now virtually complete and was dedicated July 1 with high ranking government officials participating in the program. Power production is expected to begin as soon as sufficient water has been stored in the reservoir. Water is now over the 587-foot contour. Power production is possible at the 590-foot level, but the normal operating pool level will be the 617-foot contour.

A total of 32,000,000 cubic yards was moved in excavating the spillway and building the main embankment of this $54,000,000 dam and reservoir project, which was started with the clearing of the sparsely wooded site about four miles north of Denison, Texas, on August 3, 1939. The first clearing work was done by the Schutt Construction Company of Genoa, Wisconsin. The second contract, for the outlet works area in the Texas abutment, which involved the excavation of 3,100,000 cubic yards, was completed by the Condon-Kerns Construction Company in April, 1940. The third contract, for the construction of the outlet works, was completed by the C. F. Lytle Construction Company of Sioux City, Iowa, in April, 1942, 26 months after it had been started. The Guy F. Atkinson Company of San Francisco, California, held the fourth contract, which included the construction of the huge rolled-fill embankment and the excavation for the spillway. This work began May 22, 1940. Planning and construction of Denison Dam were under the supervision of the District Engineer at Denison, Texas.

A development in the construction of the Denison Dam project, unforeseen when the plans for the dam were drawn up, was the discovery in the Spring of 1940 of oil in southern Oklahoma in the path of the reservoir water. This oil field, owned by the Pure Oil Company and known as the Cumberland, developed into the second in production in the state. To protect the Cumberland field from inundation Engineers at the Denison District office devised and supervised construction of a system of cuts and dikes. Three dikes, totalling 23,500 feet in length, were constructed by the rolled-fill method. To divert the

Pictures used to illustrate this article are through the courtesy of the War Department, U. S. Engineer Office, Denison, Texas.

● Completed spillway, looking toward right wing wall.

Washita River a mile eastward, two channels totalling 9,000 feet in length were constructed. Soil from the channels was used in the dikes. This project involved the movement of 8,000,000 cubic yards of earth.

The Denison Dam and Reservoir was authorized for flood control and for the development of hydroelectric power and other beneficial uses by Congress in 1938. A War Department appropriation which included a $5,700,000 allotment for first-year construction work was signed by President Franklin D. Roosevelt in 1939. This dam will control the floods in the Red River originating above Denison and will provide sufficient storage to generate hydroelectric power. Flood protection afforded will accrue to lands in four states; Oklahoma, Texas, Arkansas and Louisiana. Additional indirect benefits will accrue in the flooded areas through decreases of losses due to the elimination of costs of flood evacuation and rehabilitation, together with a lessened disease rate; lessened interference with transportation and communication facilities, and with the consequent interruption of orderly processes of business, and improved recreational facilities. With recommendations made by the National Park Service for the development of the resort and recreational facilities on the lake in the postwar period, the Denison Reservoir Area may become the focal point of recreational activity of the Southwest.

The outlet works of Denison Dam is located in the Texas abutment and consists of an approach channel and intake tower 260 feet long and 130 feet high housing 16—9x19—feet control gates, two to each conduit. Eight reinforced concrete conduits, each 20 feet in diameter and approximately 800 feet long, extend from the tower to the downstream portal wall, five for power units and three for flood control. The flood control conduits terminate in a stilling basin.

The Guy F. Atkinson Company had to grub the embankment site and 13 borrow areas and then selectively strip the embankment and borrow areas. The top six inches of the embankment site stripping, amounting to 160,000 cubic yards, were wasted to three disposal areas, and the topsoil from four of the borrow areas and a portion of the spillway excavation (151,500 cubic yards) was dumped in storage areas for subsequent spreading on the downstream slope of the embankment.

About 8,395,000 cubic yards of impervious fill was excavated from the eight borrow areas and transported, dumped and compacted on the six fill areas of the main embankment, on its upstream section. Approximately 4,159,300 cubic yards of pervious fill was excavated from a single borrow pit and transported, dumped and compacted on the lower portion of the downstream section of the six main embankment fill areas. In addition, 5,564,500 cubic yards of random pervious fill from three borrow areas was transported, dumped and compacted above the pervious fill on the six work areas and about 840,000 cubic yards of blanket material, from one borrow area, was dumped at the toe of the upstream side of two work areas of the main embankment where the embankment height was at a maximum.

Sand and gravel for road drains, blanket for upstream protection, for bridge approach riprap and for approach channel riprap (102,000 cubic yards) were taken from one borrow area. Spalls for upstream protection, riprap for upstream and downstream, approach channel, access bridge approach and surface drain outfalls, and derrick stone for downstream protection totalled 212,200 cubic yards, with acceptable stone obtained 65 miles away in Oklahoma.

An optimum moisture content of 18-20% in impervious fill and 12-14%

Principal Excavating, Hauling Equipment Used

No.	Size	Model	Make	Type
3	5-yd.	120-B	Bucyrus-Erie	shovel, dragline
2	2½-yd.	54-B	Bucyrus-Erie	shovel, dragline
1		50-B	Bucyrus-Erie	shovel, dragline
1	1¼-yd.	75-A	Lorain	piledriver
1	10-ton		Browning	truck crane
4	20-yd.	RU	LeTourneau	scrapers
3	12-yd.	J-13	LeTourneau	scrapers
22	11-ft. blade		LeTourneau	bulldozers
24		D-8	Caterpillar	tractors
20	20-yd.	diesel	Sterling	trucks
20	20-yd.	diesel	Western	trucks
16	4-yd.	gas	Dodge	trucks
12	13-yd.	diesel	Euclid	wagons

in pervious fill was maintained during the rolling process.

For stripping topsoil from the embankment site and four borrow areas, including topsoil from a portion of the spillway excavation, the Guy F. Atkinson Company used four 20-cu. yd. RU LeTourneau scrapers and three 12-cu. yd. J-13 LeTourneau scrapers, all pulled by Caterpillar D-8 tractors. The same equipment was used for the balance of the embankment foundation stripping and for dumping this material in a berm which was incorporated in the pervious fill in the lower levels of the downstream portion of the embankment.

A Bucyrus-Erie 120-B 5-cu. yd. shovel, also working as a dragline with a 5½-cu. yd. Esco bucket on a 70-foot boom, assisted by a Lorain 75-A 1¼-cu. yd. dragline with 45-foot boom took care of the excavation of about 100,000 cubic yards of material from a 2,000 linear foot cutoff trench. Sterling diesel trucks equipped with 20-cu. yd. Gar Wood bodies transported and dumped this material on the berm.

Steel sheet piling, instead of cutoff trenches, were used for the rest of the main embankment. This sheet piling was driven in by a No. 1 Vulcan hammer, three McKiernan-Terry hammers (a 9-B-3, 10-B-3 and 11-B-3) and two Bucyrus-Erie 54-B diesel shovels and a Bucyrus-Erie 50-B steamer, all equipped with 80-foot booms, and using 75-foot and 100-foot leads.

One of the Bucyrus-Erie 54-B diesels was used as a dragline on topsoil stripping in one of the borrow areas about 7,000 feet from the main embankment. This 3-cu. yd. dragline loaded into diesel-powered 13-cu. yd. Euclids which hauled the topsoil to areas where it could be stored for future use on the downstream slope of the main embankment.

A Bucyrus-Erie 120-B electric shovel, using a 5-cu. yd. dipper in rock and 6½-cu. yd. dipper in earth, and the previously mentioned Bucyrus-Erie 54-B diesel, Loraine 75-A, and B-E steamer handled the excavation for the spillway. A total of 1,750,000 cubic yards of clay was borrowed from the spillway excavation's two borrow areas, plus 550,000 cubic yards from an intermediate borrow area on the Texas side of the Red River, and hauled in 20-cu. yd. Sterling and Western trucks, and 4-cu. yd. Dodge trucks for use as an impervious fill in the main embankment.

The big volume excavating and hauling job at Denison Dam was getting the impervious, pervious and random pervious material out of the borrow pits and onto the main embankment. Borrow pits were literally scattered over an area of several square miles and a road map showing haul auto traffic and abandoned roads was issued to those who drove trucks or cars within the limits of the contractor's work area.

Modern excavating and hauling equipment played a major role in the construction of this huge earthern dam which supersedes Hansen Dam, near Los Angeles, as the world's largest rolled-fill dam.

CONSTRUCTION DATA ON DENISON DAM

LOCATION—

Four miles north of Denison, Texas, on Red River, and two and one-half miles west of Highway 75.

COST OF PROJECT—

The total cost of the initial project is estimated as $51,000,000.00.

DIMENSIONS OF THE EARTHEN DAM—(Rolled earth fill)

Maximum Height	165 Feet
Length of Main Dam	15,350 Feet
Length of Dike Extension	5,800 Feet
Top Width of Dam	40 Feet
Base Width of Dam	1,100 Feet
Elevation at Top of Dam (above mean sea level)	670 Feet

RESERVOIR—

At elevation of 617 feet (normal pool), reservoir will inundate 26,000 acres in Texas, 69,000 acres in Oklahoma, total of 95,000 acres, or 140 square miles.

At elevation of 640 feet (spillway crest), reservoir will inundate 41,000 acres in Texas, 105,000 acres in Oklahoma, total of 146,000 acres.

At elevation of 617 feet, length of Red River Arm will be 44 miles; at elevation of 640 feet, it will be 55 miles long.

At elevation of 617 feet, length of Washita River Arm will be 29 miles; at elevation of 640 feet, it will be 36 miles long.

WATER STORAGE CAPACITY—

Silt and Dead Storage	1,227,100 Acre Feet
Power Storage	1,852,900 Acre Feet
Flood Storage	2,745,000 Acre Feet
Total Storage Capacity	5,825,000 Acre Feet
With Outlets Closed Additional	758,000 Acre Feet
is Provided for Flood Storage (5' surcharge)	
Shore Line Approximately	1,250 Miles

THE SPILLWAY—

Maximum Width of Channel (at crest)	2,000 Feet
Contracted Width	700 Feet
Crest Elevation (above mean sea level)	640 Feet
Retaining Walls Elevation (Maximum) M. S. L.	670 Feet
Width of Discharge Channel	400 Feet

FLOOD DISCHARGE—

The record flood of 1908 is the reservoir design flood, with peak discharge of 470,000 cubic feet per second, a flood that will be completely controlled below spillway crest.

Based on the hypothetical maximum probable flood, the peak in-flow would be 1,350,000 cubic feet per second, which routed through the reservoir would give a peak outflow over the spillway of 750,000 cubic feet per second.

The spillway is designed for a discharge of 750,000 cubic feet per second, with surcharge of 22 feet ogee type.

FLOOD PROTECTION—

Cleared Land Protected	596,000 Acres
Wooded Land Protected	531,000 Acres

POWER INSTALLATION—

Five units of maximum total capacity of 175,000 kilowatt generating voltage 13,800, 0.95 power factor. Ultimate energy output 274,000,000 kilowatt hours for average year and 110,000,000 for minimum year. One unit now installed.

Transmission line from Dam to Payne Station, Sherman—15 miles, 132,000 volt, 3-phase, 60 cycle, "H" Frame wood poles. Connection provided for distribution of power to Oklahoma.

Railroad spur leads into Powerhouse. Runner shipped as one unit from York, Pa.—Weight 148,000 lbs. Powerhouse provides for 2 units—only one installed at present time.

CLEARING—

34,000 acres below elevation 620 M.S.L.

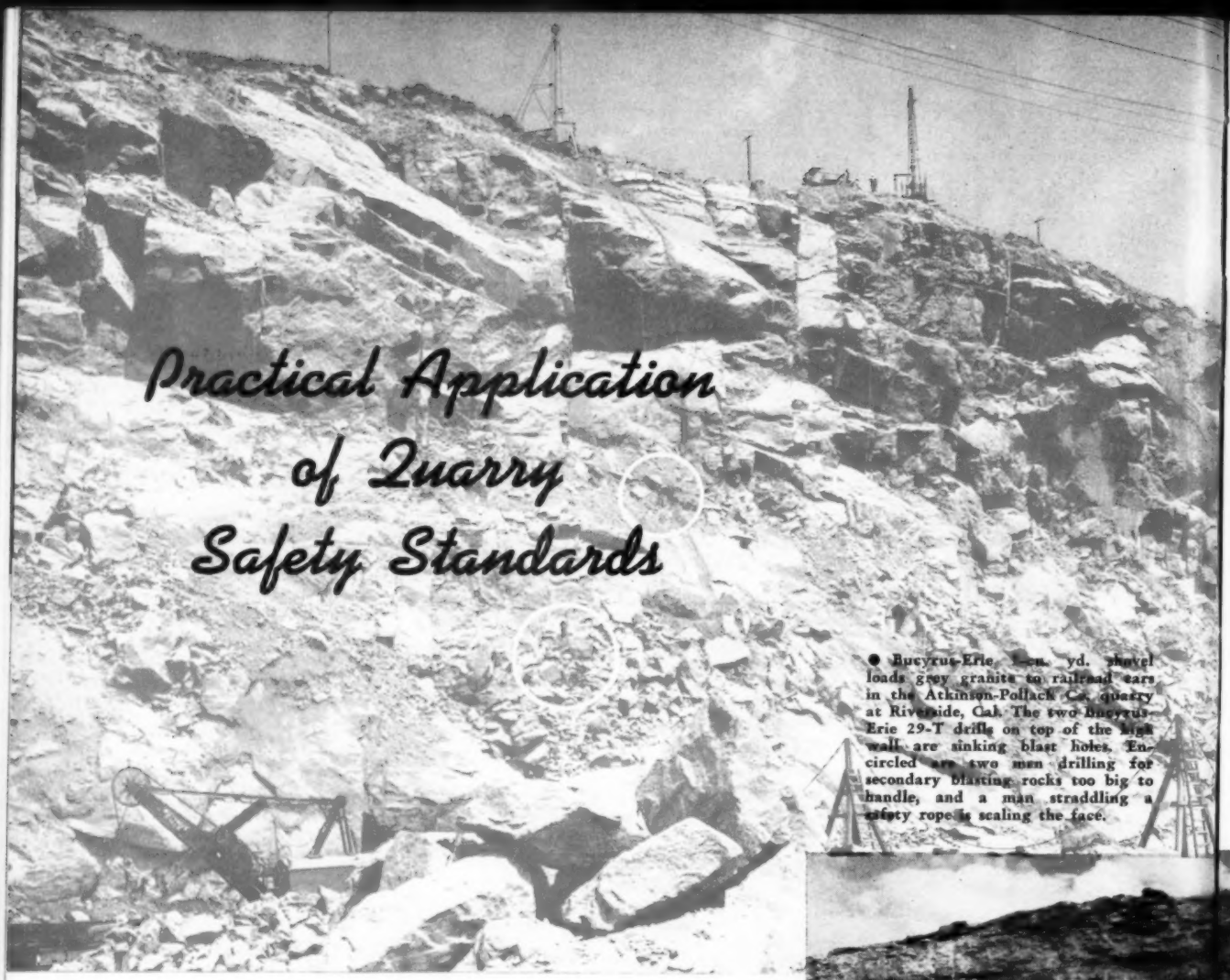
RELOCATIONS—

Railroads	30 Miles
Highways	40 Miles
Communication Lines	19 Miles
Pipe Lines	5 Miles
Transmission Lines	24 Miles

CONSTRUCTION FIGURES—

Volume of Fill in Embankment	18,500,000 Cu. Yd.
Rock and Gravel Protection	455,000 Cu. Yd.
Concrete in Intake Structure	50,000 Cu. Yd.
Concrete in Conduit and Portal Wall	150,000 Cu. Yd.
Concrete in Stilling Basin	40,000 Cu. Yd.
Concrete in Spillway	170,000 Cu. Yd.
Reinforcing Steel in Outlet Works	12,400 Tons
Reinforcing Steel in Spillway	2,300 Tons
Steel Lining (power conduits)	4,200 Tons
Control Gates, Structural Steel	350 Tons
Concrete in Powerhouse (for 2 units)	37,000 Cu. Yd.
Reinforcing Steel in Powerhouse (for 2 units)	1,120 Tons

Practical Application of Quarry Safety Standards



● Bucyrus-Erie 5-cu. yd. shovel loads grey granite to railroad cars in the Atkinson-Pollack Co. quarry at Riverside, Cal. The two Bucyrus-Erie 29-T drills on top of the high wall are sinking blast holes. Encircled are two men drilling for secondary blasting rocks too big to handle, and a man straddling a safety rope is scaling the face.

Standard safety practices must be planned so that minimum amount of work is involved to assure its successful application. Good general safety rules apply to all quarries.

By WILLIAM L. ROSCOE

(General Mill Foreman, North American Cement Corp., Catskill, N. Y.)

PRODUCTION AND safety are so closely tied in and one is so dependent upon the other that it is practically impossible to do a good job of one without doing a good job of the other.

There are some sound and practical rules or standard practices of safety which are applicable to all quarries, but any set-up for a standard practice must usually be so planned that a minimum amount of work is involved to assure its successful application.

For example, a safety rule which states, "After overburden has been stripped back a specific distance, it should be sloped to its angle of repose and precautions taken to prevent wash and slides from falling into the quarry," may not be practical for there may not be a minimum amount of work involved in following this rule to assure its practical application.

There is no doubt that the erection of baffle boards, screens, or cribbing would be an effective means of protection against a wash or slides. But suppose that at the time the job of stripping is completed the supervisor has some very pressing operating problems confronting him and he is hard-pressed for time and help. It is apparent that the above method may have a tendency to make the supervisor think up excuses for not complying with this rule. This would not be because of his unwillingness to cooperate, but rather because not enough consideration had been given

to the matter of simplifying the application to a point where there would be no occasion for excuses.

A method to prevent wash and slides from falling into a quarry after the overburden has been stripped back a specific distance, found to be entirely satisfactory for local conditions, simple in its application and very effective in its purpose, is to strip back the specified distance, have the face nearly vertical, then haul and dump screenings over the edge of the high wall to form a windrow at the base of its entire length. The only labor needed in practising this method of precaution is a truck driver and one man to level off the fill in intervening spaces between the dumped loads.

It is surprising how effectively a small windrow of screening will check wash and slides of overburden, and, of course, larger ones in proportion.

Whether or not this method would be as satisfactory for local conditions in its broader scope, can be determined only by each operator trying it out under his own operating conditions. The suggestion is made with the idea in mind of simplifying the method of precaution thus giving more assurance of its application.

If we quarry men look back and examine our past accident experience in connection with the so-called scaled quarry faces, we should arrive at but one conclusion—and that is that the record stands as an everlasting monument to our failure to recognize the fact that there is no such thing as a quarry face made safe.

Therefore, any attempt to scale the face with the idea in mind of working men under that face is exactly the same as partially guarding a piece of machinery, which, from a safety standpoint, is worse than no guard at all for it will dull the keen edge of the self-preservation instinct and make the operator have a false sense of security.

The same holds true in scaling a quarry face. The knowledge that the face has been scaled will give men a feeling of security and, naturally, they will be less on the alert than if they knew no scaling had been done.

The big difference, however, between guarding machinery and scaling quarry faces is that machinery can be guarded to a point where it is practically foolproof while a quarry face, regardless of how frequently it is scaled, can never be made entirely safe for we have the effects of the elements always to take into consideration.

The question is, "What can be done about it?" In the first place, let us consider quarries where 3-cu. yd., or larger, shovels are used. If we rid the face of all projecting large rocks and any overhanging ledges, we can forget about scaling to knock down the smaller loose stones. Let it be known that no actual scaling has been done. Then, when the drillers drill the large rocks on top of the rock pile, set a danger line 25 feet from the face—no drilling to be done closer to the face.

When the shovel takes the last cut near the face, it can dig from under the remaining large rocks and let them slide down the bank and away from the face, where they can be drilled in safety.

Some may argue the point that if a rock, too large for the shovel to cast out of the way, is let down in this way, it would hamper production. But this can be avoided by having the shovel first dig into the bank at a point where the large rocks are located leaving the better part of the bank as a reserve location while the necessary drilling and blasting of the rock is being done.

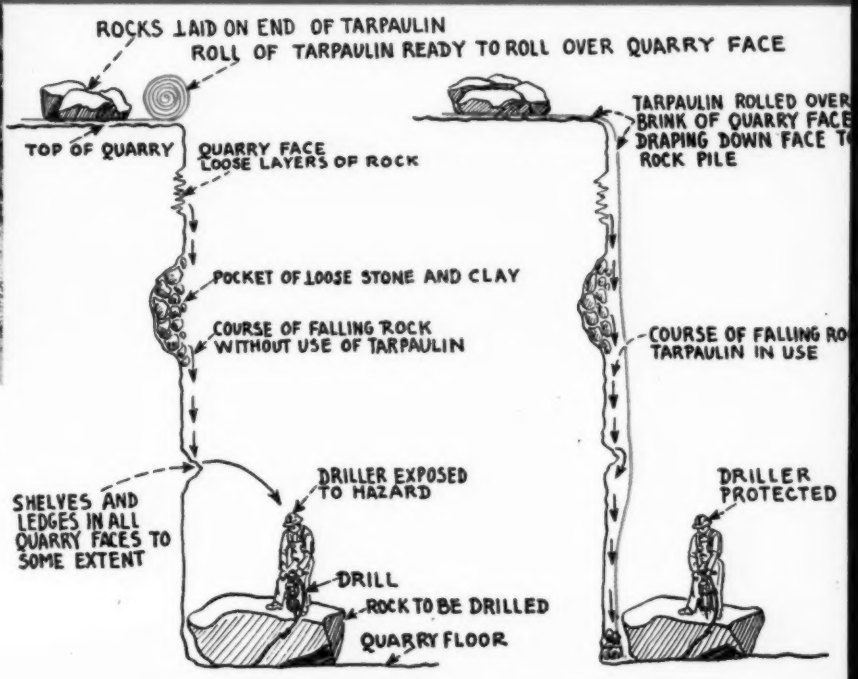
Next, let us consider quarries with smaller shovels. The smaller shovels have the advantage of greater movability; and an occasional rock, too large to handle, and too close to the face to drill, could be dug around and left laying until the next shot has been made. Then, when this shot is cleaned up to the point where the rock or rocks were left, they will be the width of the last shot farther away from the new face, which should be a safe distance.

Using a Tarpaulin

However, it will be found necessary to drill some rocks on top of the rock pile near the face which cannot be let down by digging from under without endangering the shovel and the operator. When faced with this

● This clean face provides safety to the men working on the floor of the Herzog Lime and Stone Co. limestone quarry in Ohio. The Bucyrus-Erie 5-cu. yd. shovel is loading the blasted rock to trucks.

Tarpaulin Provides Safety



● Rocks too large to handle and too close to the face to drill in safety (lower right) can be dug around and left until the next shot is made and then when this next shot is cleaned up to the point where the rocks were left, they will be the width of the last shot farther away from the new face, which should be a safe distance for secondary blasting. This picture was taken at the Kosmos Portland Cement Co. quarry in Kentucky. The shovel loading out stone is a Bucyrus-Erie 2-cu. yd. diesel.

condition, there is one effective precaution which may be taken—use a tarpaulin—the length to be determined by the height of the quarry face.

As a simple illustration of proper use of a tarpaulin, let us presume that the height of the face is 50 feet. After firing a primary shot, we will presume the rock pile next to the face is 25 feet high, leaving a distance of 25 feet from the top of the rock pile to the brink of the face. Now, suppose we have a tarpaulin ten feet wide by 35 feet long. We merely lay this roll of tarpaulin down ten feet back from the brink of the face, tie fast or lay flat stones on the one end, then roll it over the rim directly in line with the rock to be drilled. The other end would reach to the rock pile protecting the drilling from falling rock. Any small stone which may work out of the quarry face would merely slide down behind the tarpaulin, being kept close to the wall, where it would land harmlessly.

On rare occasions, where small shovels are used, rocks too large to handle may be so numerous on the quarry floor that production may be seriously hampered unless drilling is done near the face. In this case, the same method of precaution could be used by having a tarpaulin long enough to reach from ten feet back from the brink of the face to the quarry floor.

The cost of using a tarpaulin is not too great. A fine grade of tarpaulin can be purchased for around seven cents a square foot.

Quarry faces must, of course, be scaled. However, we must not lose sight of the fact that the process of scaling does not eliminate the hazard. Therefore, any additional precaution, such as the use of a tarpaulin, would be added insurance against accidents.

Fixing Responsibility

It is also important in quarry safety practice that responsibility be fixed in a rule.

Let us examine the following rule carefully in its two parts for an example in which failure to place responsibility on some individual would undoubtedly render a rule useless.

(a) "The truck driver shall not remain in the cab while the truck is being loaded with a power-shovel unless the truck cab has been specifically designed for power-shovel loading."

(b) "The truck driver shall not remain in the cab while the truck is being loaded if the dipper is swinging over the cab."

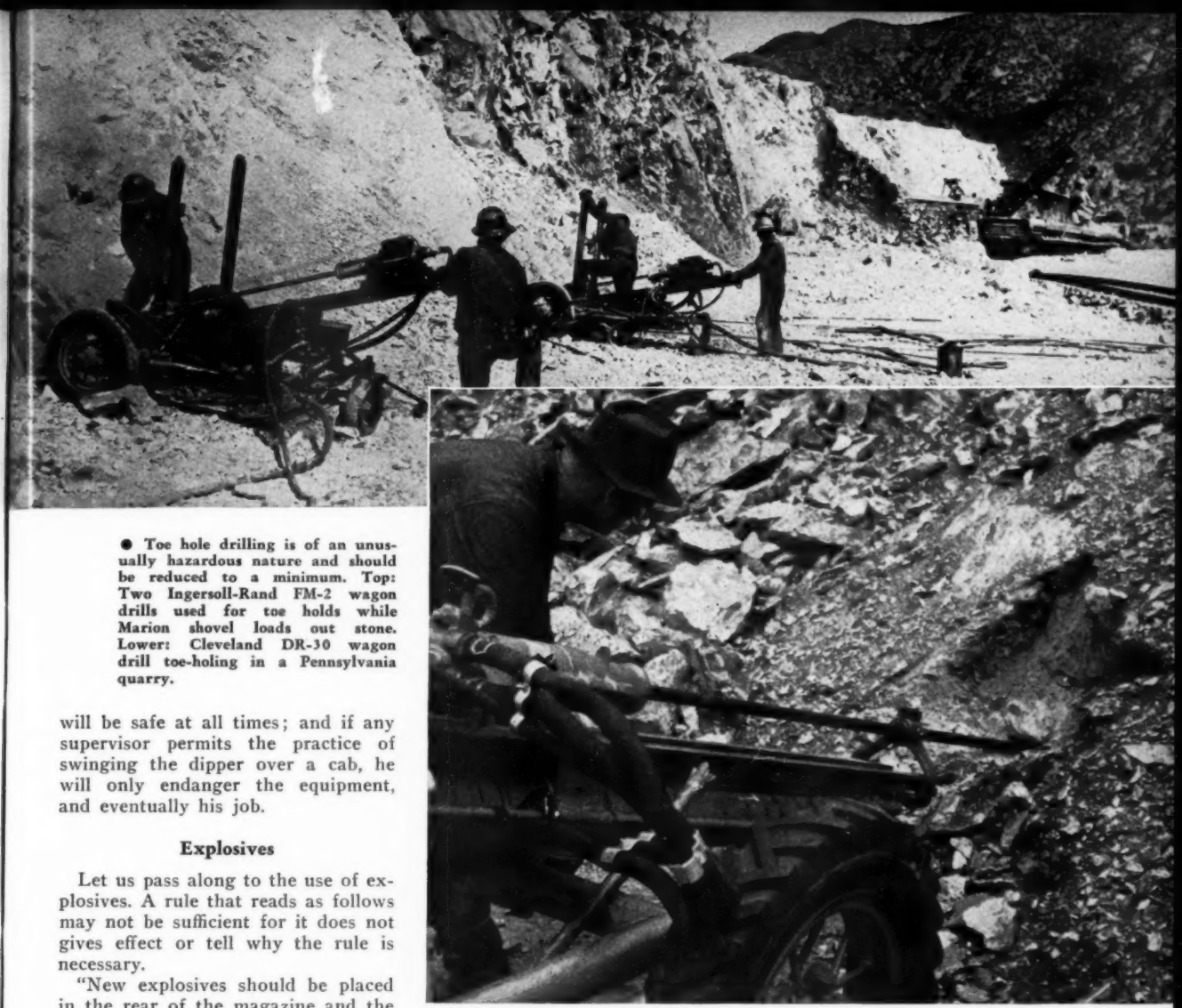
In regard to (a), I would not go so far as to say that it is impossible to design and build a cab sturdy enough to withstand the blows which are possible from a four or five-yard shovel, but do feel safe in saying that its ever being done is extremely improbable.

As for part (b), can anyone give any plausible reason for swinging the dipper of a shovel over the cab? Can you mention any operating condition which would necessitate this practice? An affirmative answer to these questions is rather doubtful. Doesn't it seem then that this rule fails to place responsibility for its application? It may even suggest dangerous practices.

Now, let us rewrite the rule in a way that one man is held responsible for its application. "The shovel operator shall not load stone in a truck until the driver is out of the cab and in the clear."

With this rule in effect, the driver

● An Ingersoll-Rand air hoist mounted on this I-R wagon drill moves it up and down the incline as it drills blast holes in this Pennsylvania quarry which lies at a 43° angle.



● Toe hole drilling is of an unusually hazardous nature and should be reduced to a minimum. Top: Two Ingersoll-Rand FM-2 wagon drills used for toe holds while Marion shovel loads out stone. Lower: Cleveland DR-30 wagon drill toe-holing in a Pennsylvania quarry.

will be safe at all times; and if any supervisor permits the practice of swinging the dipper over a cab, he will only endanger the equipment, and eventually his job.

Explosives

Let us pass along to the use of explosives. A rule that reads as follows may not be sufficient for it does not gives effect or tell why the rule is necessary.

"New explosives should be placed in the rear of the magazine and the older explosives moved forward. The older explosives should be used first to prevent deterioration from age."

The reason given for using older dynamite first is to prevent deterioration. Doesn't it seem reasonable to believe that this may be a little misleading? That is, without an explanation as to just what happens to old dynamite, isn't there a possibility that it may be looked upon as just an operating rule with no safety factor involved? The object in using the older dynamite first, from a safety viewpoint, is to prevent a leaky condition developing. When dynamite leaks the nitroglycerin settles to the bottom of the cartridge, soaks the wrapper, seeps through the container and eventually will soak through to the floor of the magazine.

In this condition, dynamite is very sensitive, unstable and absolutely unsafe to use. In the event dynamite is found to be in this condition, it should be condemned and destroyed by a qualified person. I might add, there are none so well qualified as those sent out by the manufacturer. You can rest assured these men did not get their job through any "pull" but as a result of long, hard experience and thorough training.

Another reason for suggesting a safety explanation of the rule is that men will invariably do a much better job, and do it more willingly, when they know exactly why they are doing it.

Quarries have rules designed for safe methods of thawing frozen dynamite. Inasmuch as all commercial explosives are manufactured on a low freezing formula and will not freeze in any temperatures encountered in the United States, it seems that, if this practice of thawing prevails, there is a possibility that hardened dynamite found in freezing weather is being considered as frozen.

This mistake can easily be made. There is, however, one positive method of determining the difference between hardened and frozen dynamite. A pin or the point of a pen knife blade will not penetrate frozen dynamite at all; but either will easily penetrate hardened dynamite.

Testing Blasting Circuits

A safety rule that states, "All blasting circuits should be tested with a galvanometer before attempting to fire shot," would be a very important and fine safety rule for quarries using a series hook-up, but it is of no value to a quarry that uses a parallel hook-up.

The object in testing a shot with a galvanometer is, of course, to determine whether or not there are any breaks in the wires which would cause misfires. But if we hook up a shot in parallel, we might load and hook-up 100 block holes and have a break in 99 of them but the one good one remaining intact would, when tested

(Continued on page 390)

Federal Road Funds Available to States for Postwar Work

Total Federal participation for three-year postwar period would be $1,500,000

THE FEDERAL AID Highway Bill, recently approved by the U. S. House Roads Committee, provides for a total Federal participation of $500,000,000 a year for the first three postwar years, with state matching funds of $304,728,000 the first year and $453,683,000 each for the second and third years. The total Federal participation for the three-year postwar period would be $1,500,000,000 and the total state matching funds for the same period would be $1,212,094,000 or a grand total of $2,712,094,000. In general the bill is quite similar to the H. R. 2426 introduced more than a year ago except that the sums authorized are reduced by 50 per cent.

Figures showing the approximate amount of Federal funds that would be available to each state for postwar highway purposes under H. R. 4915 have been released by the House Roads Committee and are shown in the table compiled by the National Highway Users Conference in this article. The figures used in this table have been used as a basis for unofficial estimates of the amount of state money required in each state for matching Federal aid highway funds under the terms of the bill. The estimates of state funds that would be required under the proposed program take into account increased Federal percentages available to the 13 states in which the Federal Government owns more than five per cent of the total land area. Federal participation is 60 per cent of the cost of construction in the first fiscal year and 50 per cent in the second and third years, except in states where the "public lands" exceed five per cent of the area and the Federal participation is on an increasing scale in proportion to the amount of such lands in relation to the total state area. Apportionment of all funds are based on the Federal Highway Act of 1921 with the exception of changing the weight of the factors as follows—population, one-half; area, one-fourth and post road mileage, one-fourth. The amounts shown in the table might vary to some extent in their practical application if H. R. 4915 becomes law in its present form. For example, Federal funds authorized for use in the removal of hazards at highway-railway grade crossings do not have to be matched by state funds except in the acquisition of rights-of-way. Money spent for this purpose would not affect the Federal funds available to a state, but would reduce the amount of state money needed for matching purposes in any state.

Under the terms of the new bill, funds for the first postwar year would be apportioned 30 days after passage of the act while funds for the second and third years would not be apportioned until after the war. The first apportionment would be available for making surveys and plans for the acquisition of rights-of-way as well as for postwar construction.

(Continued on Page 388)

PARTICIPATION IN HIGHWAY CONSTRUCTION COSTS UNDER H. R. 4915

Based on approximate allocations to the States

STATE	FIRST FISCAL YEAR			FOR EACH OF THE 2nd AND 3rd FISCAL YEARS			TOTAL 3 YEAR PROGRAM		
	Federal	State	Total	Federal	State	Total	Federal	State	Total
	— all amounts shown are thousands of dollars —								
Alabama	10,406	6,937	17,343	10,406	10,406	20,812	31,218	27,749	58,967
*Arizona	5,844	1,721	7,565	5,844	2,323	8,167	17,532	6,367	23,899
Arkansas	8,186	5,457	13,643	8,186	8,186	16,372	24,558	21,829	46,387
*California	21,245	10,650	31,895	21,245	15,221	36,466	63,735	41,092	104,827
*Colorado	7,757	4,117	11,874	7,757	5,933	13,690	23,271	15,983	39,254
Connecticut	3,865	2,577	6,442	3,865	3,865	7,730	11,595	10,307	21,902
Delaware	2,438	1,626	4,064	2,438	2,438	4,876	7,314	6,502	13,816
Florida	7,099	4,733	11,832	7,099	7,099	14,198	21,297	18,931	40,228
Georgia	12,231	8,154	20,385	12,231	12,231	24,462	36,693	32,616	69,309
*Idaho	5,114	2,242	7,356	5,114	3,148	8,262	15,342	8,538	23,880
Illinois	21,876	14,584	36,460	21,876	21,876	43,752	65,628	58,336	123,964
Indiana	12,104	8,069	20,173	12,104	12,104	24,208	36,312	32,277	68,589
Iowa	11,598	7,732	19,330	11,598	11,598	23,196	34,794	30,928	65,722
Kansas	11,078	7,385	18,463	11,078	11,078	22,156	33,234	29,541	62,775
Kentucky	9,566	6,377	15,943	9,566	9,566	19,132	28,698	25,509	54,207
Louisiana	7,732	5,155	12,887	7,732	7,732	15,464	23,196	20,619	43,815
Maine	4,013	2,675	6,688	4,013	4,013	8,026	12,039	10,701	22,740
Maryland	4,692	3,128	7,820	4,692	4,692	9,384	14,076	12,512	26,588
Mass.	8,785	5,857	14,642	8,785	8,785	17,570	26,355	23,427	49,782
Michigan	16,130	10,753	26,883	16,130	16,130	32,260	48,390	43,013	91,403
Minnesota	12,613	8,409	21,022	12,613	12,613	25,226	37,839	33,635	71,474
Mississippi	8,705	5,803	14,508	8,705	8,705	17,410	26,115	23,213	49,328
Missouri	14,519	9,679	24,198	14,519	14,519	29,038	43,557	38,717	82,274
*Montana	8,093	4,240	12,333	8,093	6,100	14,193	24,279	16,440	40,719
Nebraska	8,660	5,773	14,433	8,660	8,660	17,320	25,980	23,093	49,073
*Nevada	4,890	724	5,614	4,890	940	5,830	14,670	2,604	17,274
N. H.	2,438	1,626	4,064	2,438	2,438	4,876	7,314	6,502	13,816
N. Jersey	8,516	5,677	14,193	8,516	8,516	17,032	25,548	22,709	48,257
*N. Mexico	6,542	2,636	9,178	6,542	3,664	10,206	19,626	9,964	29,590
New York	30,195	20,130	50,325	30,195	30,195	60,390	90,585	80,520	171,105
N. Carolina	12,261	8,174	20,435	12,261	12,261	24,522	36,783	32,696	69,479
N. Dakota	6,177	4,118	10,295	6,177	6,177	12,354	18,531	16,472	35,003
Ohio	19,397	12,931	32,328	19,397	19,397	38,794	58,191	51,725	109,916
*Oklahoma	10,581	6,417	16,998	10,581	9,455	20,036	31,743	25,327	57,070
*Oregon	7,204	3,141	10,345	7,204	4,406	11,610	21,612	11,953	33,565
Pa.	24,234	16,156	40,390	24,234	24,234	48,468	72,702	64,624	137,326
Rhode Island	2,438	1,626	4,064	2,438	2,438	4,876	7,314	6,502	13,816
S. Carolina	6,791	4,527	11,318	6,791	6,791	13,582	20,373	18,109	38,482
*S. Dakota	6,473	3,479	9,952	6,473	5,024	11,497	19,419	13,527	32,946
Tennessee	10,575	7,050	17,625	10,575	10,575	21,150	31,725	28,200	59,925
Texas	29,547	19,698	49,245	29,547	29,547	59,094	88,641	78,792	167,433
*Utah	4,720	1,252	5,972	4,720	1,677	6,397	14,160	4,606	18,766
Vermont	2,438	1,626	4,064	2,438	2,438	4,876	7,314	6,502	13,816
Virginia	9,270	6,180	15,450	9,270	9,270	18,540	27,810	24,720	52,530
*Wash.	7,471	4,388	11,859	7,471	6,429	13,900	22,413	17,246	39,659
W. Virginia	5,831	3,887	9,718	5,831	5,831	11,662	17,493	15,549	33,042
Wisconsin	11,857	7,905	19,762	11,857	11,857	23,714	35,571	31,619	67,190
*Wyoming	4,898	1,942	6,840	4,898	2,695	7,593	14,694	7,332	22,026
Hawaii	2,438	1,625	4,063	2,438	2,438	4,876	7,314	6,501	13,815
D. of C.	2,438	1,626	4,064	2,438	2,438	4,876	7,314	6,502	13,816
P. Rico	3,531	2,354	5,885	3,531	3,531	7,602	10,593	9,416	20,009
Total Cons.	487,500 (62%)	304,728 (38%)	792,228 (100%)	487,500 (52%)	453,683 (48%)	941,183 (100%)	1,462,500 (55%)	1,212,094 (45%)	2,674,594 (100%)
Adm. and Engin.	12,500	—	12,500	12,500	—	12,500	37,500	—	37,500
Grand Total	500,000	304,728	804,728	500,000	453,683	953,683	1,500,000	1,212,094	2,712,094

* States in which "public lands" exceed 5% of the area.

AN UNBEATABLE COMBINATION

This war has proved in a thousand ways the importance of teamwork; teamwork between army, navy and industry, between navy and air force, between artillery and infantry, between a soldier and his gun. Good men with poor equipment haven't been able to stand up to inferior men with better equipment. Good men *and* good equipment are unbeatable . . . on the fighting fronts, on the air bases, in the shipyards, in the quarries, in the metal mines, in the coal mines.

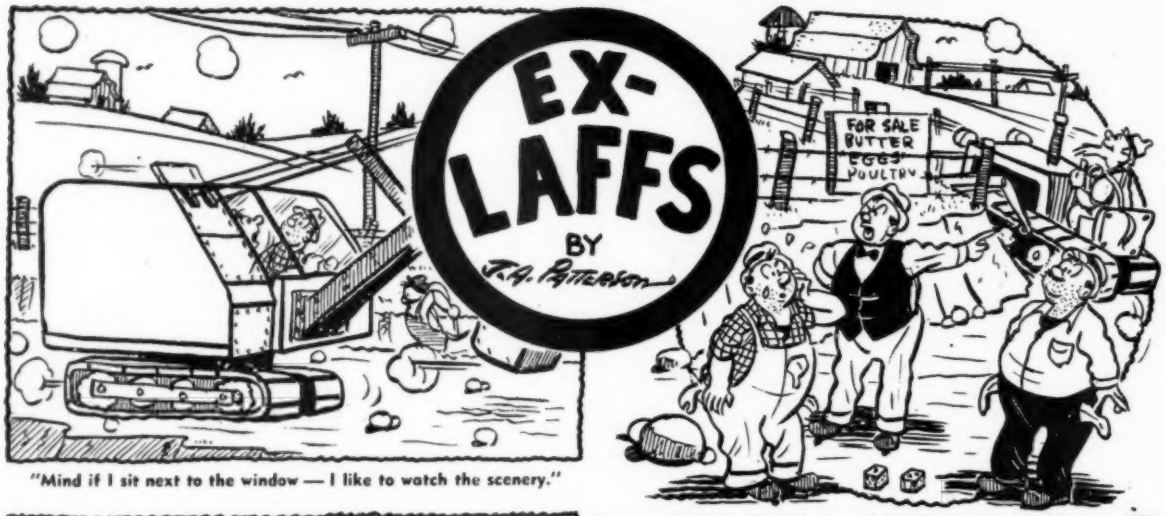
Experience and reputation in designing and building outstanding large excavating equipment led to the selection of Bucyrus-Erie to work with the Army on the design and manufacture of the new 240-mm. howitzer, now in action on the Italian front. We're proud of that selection and of the phenomenal accuracy this weapon is demonstrating in battle. The same factors that make this largest U. S. mobile gun a leader, make your Bucyrus-Erie excavators "years ahead."

In this war, all over the world, Bucyrus-Erie excavators, in the hands of good men, are shattering old production records. Post-war Bucyrus-Eries in the hands of your men will be an unbeatable combination. V-55 C

ARMY E NAVY

Bucyrus-Erie

SOUTH MILWAUKEE, WISCONSIN, U. S. A.



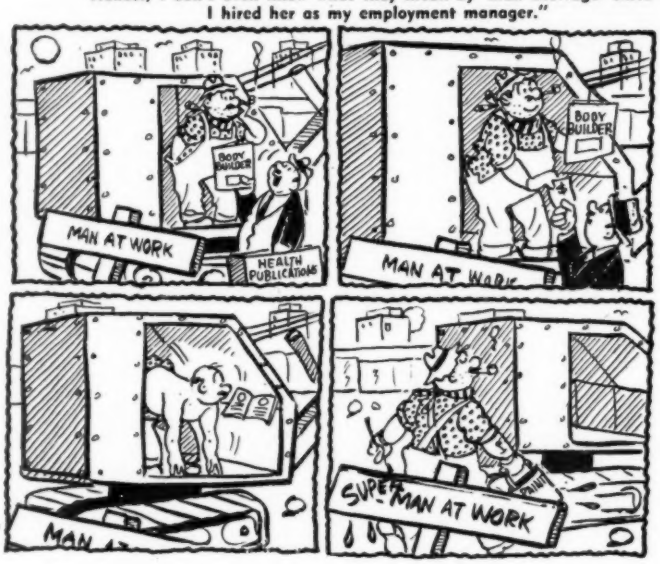
"Mind if I sit next to the window — I like to watch the scenery."

"So you thought you'd hook the old 'hick' for a pound of butter, eh?"

"An' that ain't all — the next time you have anything to say to me — you come out to th' shovel an' see me!"

"Honest, I don't even know what they mean by 'man shortage' since I hired her as my employment manager."

"You an' your dates! Next time you let th' tailor do this fur ya!"



BACK OF EVERY ATTACK . . .

Preformed wire rope

Out where fighting Yanks attack, big howitzers pummel the enemy. But shells that pack a deadly wallop are too heavy for men to lift.

So a crane—rigged with Preformed wire rope—hoists the shell, then shoves it home. Every second counts. That's why the rope is Preformed. It lasts longer than ordinary wire rope. It handles faster and easier, speeding every operation. And it prevents accidents, too, because it's safer.

On the firing line—as on the production line—Preformed is proving that it's the tough wire rope for the tough war jobs.

On practically all kinds of mobile equipment, Preformed is back of every attack.

ASK YOUR OWN WIRE ROPE MANUFACTURER OR SUPPLIER FOR PREFORMED WIRE ROPE

Shots from the FIRING LINE

Shortage of Equipment in Spite of Triple Production

Heavy military demand for tracklaying tractors, power cranes and shovels, and certain other types of construction equipment have resulted in shortages for civilian use, despite the fact that over-all production has more than tripled since 1937, the Over-all Construction Machinery Industry Advisory Committee was told by the War Production Board.

Total production in 1943 amounted to $721,690,000, as compared with $247,529,000 in 1937; the number of workers employed by the industry increased from 32,000 in 1937 to 82,000 in 1943, WPB said.

Tractor manufacture accounted for 35 per cent of 1943 production, by dollar value; 25 per cent of production was for cranes and shovels; all other equipment made up the remainder.

Production data for various types of construction machinery, as presented at the meeting, follow:

Tracklaying tractors: 1937: $100,000,000 and 34,602 units; 1943: $262,000,000 and 25,170 units; 1944 estimate: 30,000 units. The decrease in unit production in 1943 is due to production of more of the larger sizes.

Power cranes and shovels: 1937: 3,286 units; 1943: 7,218 units; 1944 estimate: 8,400 units. Military requirements use approximately 95 per cent of all power cranes and shovels produced.

Bulldozers: 1943: 16,113 units; 1944 estimate: 23,000 units.

Release Water from Friant Dam Reservoir

A half-century battle of the people of Madera County, California, for irrigation water for their parched out fertile acres came to a successful end June 4 with the opening of an 84-inch needle valve releasing water from the Friant Dam reservoir at public ceremonies.

Primary Magnesium Output Shows Increase

Primary magnesium production averaged over 41,000,000 pounds a month during the first quarter of 1944 and exceeded output for all previous periods, according to information released by the Aluminum and Magnesium Division of the War Production Board. The quarter's record will probably remain as the peak for the duration of the war, WPB said, since the production curtailment recently announced by the agency took effect during the latter part of March. Secondary recovery rose rapidly in the quarter and reached a new high of 3,500,000 pounds in March. The sudden increase in secondary recovery resulted from the melting of an accumulation of scrap in facilities previously occupied with the alloying of primary metal.

• Bucyrus-Erie ⅜-cu. yd. dragline loading tailings which had been dumped into an abandoned open pit mine. The machine, owned by M. Evans of Waro, Mo., is digging 35 feet deep with a 28-ft. boom. The tailings are sent to a mill.

New England Projects Total Half Billion

By F. N. Hollingsworth

New England's planned postwar public works projects to date total a half billion dollars, according to a report issued by the New England Council's Community Development Committee. Preliminary results of a canvass of state and local public works planning in the area indicate a reservoir of at least $350,000,000, with an additional $150,000 for states and communities which haven't as yet reported tentative amounts.

More than $60,000,000 of the total has been blueprinted for highway construction by the six states. This is part of their long range $200,000 highway program, with designing and surveys scheduled for some years to come.

(Continued on page 366)

ARE YOU CURIOUS ABOUT "POSTWAR" TRAILERS?

Here is Fruehauf's Position On the Subject

EVERY DAY, in Fruehauf's Experimental Department, men are putting into form the improvements for civilian Trailers developed by our designing engineers.

That's been going on for years, of course, but war has stepped up the pace—because, in developing over 100 different types of Trailers for military use, our engineers have found scores of ways to improve commercial units, too.

And the thing that's most important to you is that these improvements are made available to you just as soon as possible after they are perfected.

That means immediately in many cases. But sometimes it may mean a delay of weeks or months. And some improvements may have to be "shelved" until war is over. The availability of tools, machines and materials controls that.

Certainly your "postwar" Fruehauf will be a better Trailer than the one you get today. It would be better under normal circumstances, just as this year's Fruehauf is a better product than last year's.

How much better it will be is, of course, something which cannot be answered at this time. It depends upon how many improvements already perfected must await the war's end before we can pass them on to you—and it depends, also, upon what the manufacturers who supply us with materials and parts develop for us.

But this you can be sure of:

Insofar as we are able to do so, we will continue to incorporate in the design and construction of Fruehauf Trailers all improvements as they are perfected.

There is nothing in the immediate postwar picture now which gives us any reason to expect a startling unveiling of radically new postwar models.

Improvements will be made as we go along; nothing will be kept back from you voluntarily—above all, the element of surprise will have no part in our planning.

You buy Trailers—and we build them—for only one purpose: to cut your haulage costs. And we believe we are justified in assuring you that the Fruehauf you buy—whether it is today, next month or next year—will give you a better-than-usual return on your investment.

This year we have been authorized to build some 12,000 Trailers for civilian use. Naturally, this does not compare with our peacetime volume or with the demands of the industry, but it is sufficiently large to enable us to "tool up" now for many improvements which, on the basis of smaller volume, would have to wait until normal peacetime production is resumed.

AN ENTIRE PLANT PRODUCING FRUEHAUF CARRYALLS

Since shortly after Pearl Harbor the manufacturing capacity of one entire Fruehauf factory has been devoted exclusively to the production of Carryall Trailers for military service. These extensive facilities will enable Fruehauf Carryalls to render vital and immediate service in the gigantic construction program that awaits the dawn of peace.

World's Largest Builders of Truck-Trailers *Service in Principal Cities*

FRUEHAUF TRAILER COMPANY • DETROIT 32

Postwar construction plans for rebuilding, relocating and widening highways and for lengthening airports definitely show the trend is to longer hauls. To profitably handle these longer-haul jobs of tomorrow, you'll need equipment that can move big yardages fast. Tournapulls are the answer. Compare them with ordinary tractors and tractor-drawn scrapers for:

SPEED

Tractor speeds range from 1.5 to 7 m.p.h. Tournapulls operate from 2.6 to 14.3 m.p.h. and average 2 to 3 times faster than the fastest tractors. Chart here shows what this greater speed can mean to you in extra yardage.

YARDAGE

ONE-WAY HAUL DISTANCE—CU. YDS. PER HOUR*

Tractor-drawn Scrapers:	400′	600′	800′	1,000′	2,000′	3,000′	4,000′	5,000′	6,000′
30-Yd. Capacity	—	—	175	153	97	71	56	46	39
23-Yd. Capacity	—	187	162	142	89	65	51	—	—
18-Yd. Capacity	196	163	139	122	74	—	—	—	—
15-Yd. Capacity	170	142	121	106	65	—	—	—	—
With 15-Yd. Super C Tournapull you get:	200	180	168	156	116	91	76	65	55

*All units pusher loaded on level.

Example: On a 2,000-foot, one-way haul, the Super C Tournapull will move, on an average, 27 cu. yds. more per hour than a 23-yard scraper. On 10,000-hour working life, that's 270,000 cu. yds. *Figure the gain to you at your own usual bid price!*

TOURNAPULLS

RUBBER-TIRED POWER FOR FASTER EARTHMOVING

RNAPULLS

ARY TRACTORS ON THESE 4 POINTS

YARDAGE WEIGHT POWER

WEIGHT

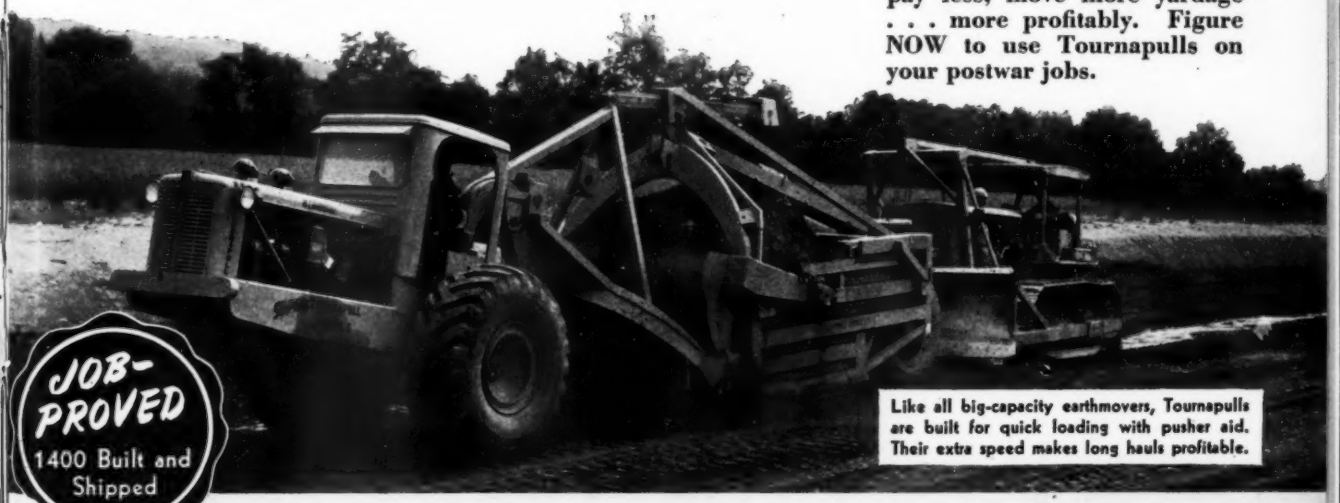
Prime Mover and Equipment	Super C Tournapull & 15-Yd. Carryall	Tractor & 15-Yd. Scraper Approx.	Tractor & 18-Yd. Scraper Approx.	Tractor & 23-Yd. Scraper Approx.	Tractor & 30-Yd. Scraper Approx.
Weight of Combined Units	31,000#	53,500#	57,575#	65,575#	70,875#

On a 30-yard scraper, this difference in weight is the equivalent of 14.5 pay yards. Can you afford to lug that much dead weight back and forth over a 10,000-hour working life?

POWER

What's more, the Tournapull has more power for its working weight—150 d. b. h. p. for 31,000 lbs.—which gives you higher average speeds and quicker getaway.

Why use slow-moving, overweight equipment, when you can have faster-moving, job-proved Tournapulls? You'll pay less, move more yardage . . . more profitably. Figure NOW to use Tournapulls on your postwar jobs.



JOB-PROVED
1400 Built and Shipped

Like all big-capacity earthmovers, Tournapulls are built for quick loading with pusher aid. Their extra speed makes long hauls profitable.

LETOURNEAU

PEORIA, ILLINOIS • STOCKTON, CALIFORNIA

Manufacturers of TOURNAPULLS*, DOZERS, CARRYALL* SCRAPERS, POWER CONTROL UNITS, ROOTERS*, SHEEP'S FOOT ROLLERS, TOURNAROPE*, TOURNA-TRAILERS*, TOURNAWELD*, TOURNACRANES*.

*Trade Mark Reg. U. S. Pat. off.

Shots from the Firing Line

(Continued from page 362)

State enabling acts have given cities and towns an opportunity to build up reserve funds for financing their programs. Maine, for example, through legislative action, transferred $1,000,000 from the state sinking fund to "postwar works reserve," with $50,000 of this earmarked for plans, specifications and surveys. The highway commission of Maine reports $15,244,000 blueprinted for highway construction, with $13,553,000 more to be added.

In Massachusetts $750,000 is available for preparing plans and specifications of state projects approved by the Emergency Public Works Commission, sufficient to blueprint up to $20,000,000 in public works. The state highway program, covering a long range to total $100,000,000, is now under study by a special legislative commission with cooperation of the Highway Division, the Department of Public Works, the State Planning Board and Metropolitan Boston areas. Bid specifications are now ready for highway work valued at $10,000,000 and by January, 1945 will total $25,000,000. By January, 1946, the total will reach from $45,000,000 to $50,000,000.

Connecticut's Highway Department reports that highway and bridge projects involving $12,500,000 are already in blueprint, while many other projects of the department's 10-year program are already either under survey or in the design state.

Rhode Island expects to spend $22,000,000 for highway improvements and new construction and bridges over a period of three to five years. Of this about $2,000,000 is already in blueprint.

• Rows of tractors and bulldozers are lined up at a huge U. S. Army Engineers' supply depot, somewhere in England, ready for issue to Engineer units which played a big part in the invasion of Europe. Excavating equipment is playing a major role in the war.

U. S. Signal Corps Photo

Contractors' Concrete Mixers

Only 2631 contractors' concrete mixers were shipped in 1943. This contrasts with a yearly average of almost 7000 for the period 1937-1941 when in one year, 1941, over 9200 were shipped. The sharp decline during 1943 resulted from the great reduction in civilian construction and was concentrated in the small sizes (3½ and 5 cu. ft.) which accounted for approximately 67 per cent of all shipments during 1937-1941 and less than 22 per cent in 1943. The 14 cu. ft. size in the five year period averaged about five per cent of the total. As a result of the large demand from the military, this size made up nearly 40 per cent of the total in 1943. The sizes over 14 cu. ft., in 1943 as in the pre-war period (1937-1941), amounted to less than one per cent of the total.

These data represent 100 per cent of the industry, based on reports from 23 companies in 1937-1941 and from nine companies, in 1943.

New Pricing Method for Sale of Used Equipment

An alternative pricing method for sales of used construction equipment limited to tractors, shovels, draglines, cranes and backhoes, urgently needed for essential operations in coal-stripping, logging and petroleum production, was announced by the Office of Price Administration.

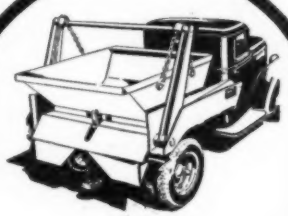
The new alternative pricing method, effective June 14, 1944, provides a sliding scale of prices, in terms of percentages of new base prices for the equipment. This will increase the present maximum prices by adding five per cent to 55 per cent of the new base price (which is the present applicable ceiling for "as-is" equipment) for each more recent year of manufacture beginning with the year 1939 until a new

TRUCK SHORTAGE

One truck does the work of many when equipped with a Load Lugger. Saves trucks, cuts costs.

MANPOWER SHORTAGE

Fewer drivers needed when a Load Lugger and buckets replace several ordinary trucks.



Brooks

LOAD LUGGER

solves today's

TOUGHEST PROBLEMS

This modern material handling unit with detachable one-piece buckets . . . can be mounted on any standard truck chassis. It is the answer to quarry operators' problems of hauling rock, feeding crushers, stripping overburden and many other jobs.

Write for Catalog No. 44

ECONOMY

Load Luggers save on equipment costs because fewer trucks are required on the job.

PRIORITIES

Easier to purchase Load Lugger units than to buy new trucks . . . essential equipment.

UPKEEP EXPENSE

Fewer trucks for doing same job with Load Lugger mean less maintenance.

RUNNING EXPENSE

Using Load Lugger with truck insures economy in operating costs.

307 Davenport Road, Knoxville 8, Tennessee
Distributors in all Principal Cities

Brooks EQUIPMENT AND MFG. CO.

A REAL ROCK SHOVEL *Licks* DECEW'S HARD ROCK!

DECEW was a real test of equipment! 250,000 cu. yds. of solid rock faced the contractors on the DeCew Falls development where Ontario's Hydro-Electric Power Commission planned an increase in Canada's power supply.

It is jobs like this—war jobs where the pressure is on—rock jobs—that give you the real story on the performance of shovels, cranes, and draglines. It is jobs like this that demonstrate the superiority of Northwest Rock Shovels. Now is the time to form dependable opinions based on the experience of users of all makes of equipment to guide you in your future plans. What shovels and cranes today are really meeting wartime requirements? Those are the ones that will make successful peacetime contracts. Ask how the Northwests are doing!

ASK how the NORTHWESTS are doing!

—and when you have a real Rock Shovel you won't have to worry about output in dirt

NORTHWEST ENGINEERING CO.
1727 Steger Building
28 E. Jackson Blvd., Chicago 4, Ill.

NORTHWEST

SHOVELS • CRANES • DRAGLINES • PULLSHOVELS

• Native wine casks filled with dirt by this English Ruston-Bucyrus shovel were used by U. S. Engineers to build airplane revetments at the Anzio beachhead. Sand bags were placed between the casks. Each revetment used from 80 to 100 casks.

U. S. Signal Corps Photo

ceiling of 80 per cent of the new base price of the equipment is attained for machines manufactured in 1943.

The 55 per cent of new base price formerly applied to machines sold "as-is," with an alternative method for machines of recent manufacture, which permitted sale at a price calculated by subtracting specified annual depreciation rates from the new base price.

New base prices for construction equipment are usually f.o.b. factory prices for the equipment when new, unless established maximum prices are for delivered or installed machines, in which case the new base price is either the delivered or installed price of the equipment when new.

The percentage pricing method provided by the new action, is a third alternative method, designed to bring out a supply of used machines which the War Production Board indicates present owners will not sell at the former permissible maximum prices. The need for the desired construction equipment cannot be met from available production of new equipment, and therefore must be met from the used supply in the hands of contractors. Some of this equipment is now idle or will soon become idle owing to the diminishing programs of construction work.

Carolina Road Builders Affiliate with ARBA

Organization of the Carolina Road Builders Association has been completed and the new group has affiliated with the American Road Builders' Association, according to Charles M. Upham, Engineer-Director.

The new Association will serve both North Carolina and South Carolina, with headquarters in Raleigh, N. C. Heading the new Association is President Nello L. Teer, Jr., of Durham, N. C. Teer has been associated for many years with his father, a pioneer in the contracting business in the South.

Warren J. Mann of Raleigh, N. C., has been appointed Secretary-Treasurer. Mann also serves as Executive Secretary to the North Carolina Licensing Board for Contractors.

The Carolina group is already devoting considerable energy toward assisting in the formation of an adequate postwar highway program, according to Mann. Among the other objectives of the Association are: protect motorists by vigorously opposing diversion of highway revenue; promote educational and other measures for the safe use of highways and streets; combat unfair practices; encourage efficiency among contractors; cooperate with other contractors' associations and with the ARBA in working for the general good of the highway industry.

In addition to Teer and Mann, the following officers have been elected: Vice-president, E. H. Hines, Greenwood, S. C.; Governors, F. D. Cline, Raleigh, N. C., W. E. Graham, Cleveland, N. C., J. R. Suber, Whitmire, S. C., and T. R. McMeekin, Cheraw, S. C.

James J. Skelly, President, and A. E. O'Brien, Executive-Secretary of the Highway Contractors Division of the ARBA, assisted in the formation of the new Association.

Section of New Virginia Road Open

Virginia's new Henry G. Shirley Memorial Highway has been opened for traffic from the War Department's Pentagon Building road network south to the Arlington-Fairfax County line. Eventually the two-lane express highway will join U. S. Route No. 1 at Woodbridge, Virginia, and will route traffic around the City of Alexandria into Washington, D. C.

Only two of the four lanes to be built eventually are now in operation although the grading for the second two lanes has been completed.

Tighten Control Over Sale of Tractor Repair Parts

The War Production Board tightened control over the sale of repair parts for track-laying tractors and allocated 65 per cent of tractor manufacturers' shipments of repair parts to the military agencies. The action was taken by amendment of Order L-53-b and except for provisions allocating 65 per cent of the deliveries to the military, is effective July 3, 1944.

All producers of track-laying tractor repair parts are now covered by the order. Formerly only producers of tractors who also manufactured repair parts were covered. Allocation of 65 per cent of production to the military affects only manufacturers of tractors who also manufacture repair parts. All

MORE YARDAGE with LESS LABOR

Sauerman Cableway moves gravel from bar in river to plant on top of high bluff.

Where loose materials (such as sand, gravel, blasted rock, ore, etc.) must be dug, hauled and dumped at ranges from 100 to 1500 ft. the economical way to do it is with a SAUERMAN Scraper or Slackline Cableway.

These machines are made in sizes to haul 10 to 600 cubic yards per hour, require only one operator, and demand little in maintenance. SAUERMAN units have made low cost records on dig-and-haul jobs all over the world for 35 years.

SAUERMAN BROS., INC.
574 S. Clinton St., Chicago

SAUERMAN
LONG RANGE MACHINES

ERIE PORTABLE AggreMeters

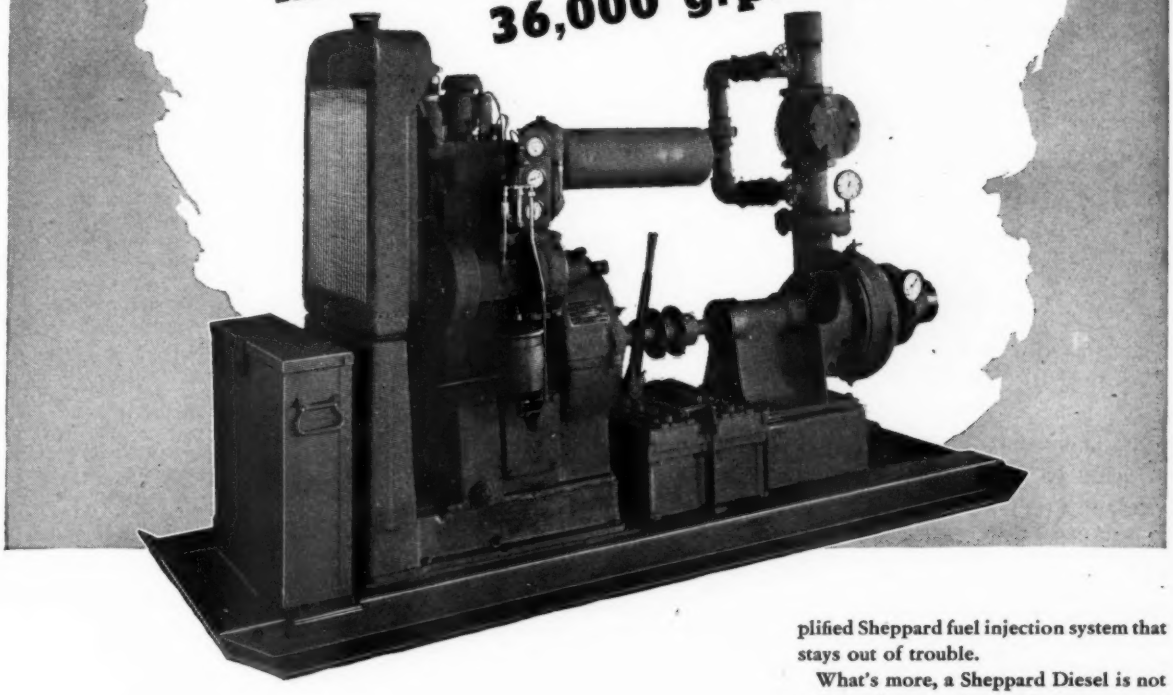
36-YARD
52-YARD
68-YARD

Plan now for post-war. Get the complete story on these 3 Erie standard portable storage and weighing AggreMeters

ERIE STEEL CONSTRUCTION CO · ERIE, PA.
AggreMeters · Buckets · Concrete Plants · Traveling Cranes

A BIG NICKEL'S WORTH OF DEPENDABLE POWER!

Sheppard Diesel Driven Allis-Chalmers Unit Pumps 36,000 g.p.h. for 5c



THE Sheppard Diesel 7-A Engine direct-connected to this Allis-Chalmers unit provides power to pump 36,000 gallons per hour with a 30 foot head. Fuel cost is 5c per hour. That's a lot of dependable power for a nickel!

This Sheppard Diesel reduces the cost of washing sand, coal, silt, oil field pumping operations. It is also ideal for standby fire protection. That's because complete dependability and readiness to go into action at any moment are assured by Sheppard Diesel's oil cooled pistons . . . hardened, replaceable cylinder liners . . . 4% governor regulation (closer if required) . . . and, especially, by the simplified Sheppard fuel injection system that stays out of trouble.

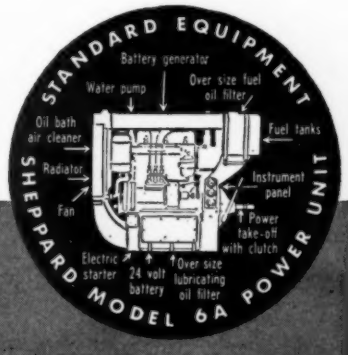
What's more, a Sheppard Diesel is not only ready to go into action at *any* moment—it's ready to go into action *the* moment you receive it. It's delivered complete. You need only add fuel and water and press the starter button.

And once you press the starter button on a Sheppard Diesel, you're on the way to learning how low in cost dependable power can be!

* * *

We, too, are busy trying to help end this war as speedily as possible. But the reconversion that lies ahead is an important problem and, like other thoughtful industries, Sheppard is planning for it. Sheppard engineers are ready to help you plan your post-war Diesel requirements now. To essential industries, a few Sheppard Diesels are available on priority. Write for information and illustrated data sheet on the Sheppard Model 7-A today.

R. H. SHEPPARD COMPANY, HANOVER, PA.



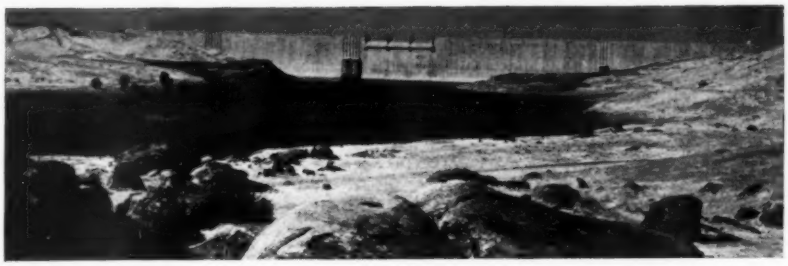
Sheppard

ALL AMERICAN DIESELS

other provisions of the order affect all manufacturers of repair parts.

During the six-month period, July 1 to December 31, 1944, and during each succeeding year, up to 65 per cent of the total shipments of repair parts, by dollar value, shipped by manufacturers of tractors may be used to fill military orders. Formerly, these manufacturers were permitted to deliver only up to 40 per cent of their annual shipments to the military, and since March, 1944, when this restriction was removed, there has been no percentage allocation for military use.

Shipments of any critical repair part—that is, any part for which unfilled orders exceed inventory—must be divided by the tractor manufacturers on the basis of 65 per cent for the military and 35 per cent for other orders. No shipments of critical parts may be made to dealers in the United States or Canada for stock. Purchase orders from dealers are to be treated as orders for stock unless accompanied by a statement that the parts are needed to fill customers' orders actually on hand that cannot be filled from stock.



• Millerton Lake water was released into the Madera Canal for use on Madera County, California, lands at a celebration at Friant Dam on June 4. Friant Dam, one of the huge structures of the Central Valley Project, is shown here in a general view of the upstream face of the dam from a point in the reservoir area.

The 35 per cent of critical parts for non-military orders need not be broken down according to use. Formerly, the 60 per cent reserved for non-military orders was allocated on the basis of 20 per cent to war projects (as formerly defined in the order), 20 per cent to essential civilian operations (as defined), 15 per cent to export, and five per cent to all others.

The unrestricted use of the 35 per cent is designed to enable manufacturers and dealers to take better care of emergency breakdowns on essential work and to simplify the manufacturers' shipping procedure, WPB said.

Repair parts may be purchased from producers and dealers only through emergency certification of the purchase order, with certain specified exemptions. The form of the certification is given in the order. It states that the parts are immediately needed to put the tractor (or tractors) owned by the purchaser into serviceable condition and are not for stock; that similar parts are not on hand; that another purchase order for these parts has not been placed elsewhere; and that the parts will be used only on the tractor (or tractors) designated by serial number. This certification is substantially simpler and shorter than the one formerly required, WPB said.

Postwar Public Works Plans Far in Arrears

State and local governments in general are far in arrears in preparing blueprints, acquiring rights of way and taking other preparatory steps for postwar construction, according to surveys made by the American Road Builders' Association.

"Highway construction plans hold a substantial lead over other types of

SPEEDS UP WORK

SAVES MATERIAL

THE Construction Industry can well be proud of its wartime production record. Its high-operating efficiency — developed during peace —had much to do to bring the war to its "final phase".

In keeping with a well-established American principle, the contractors of this country have long been quality-conscious about their production tools. This demand for greater efficiency through quality equipment is reflected in the widespread acceptance of "HERCULES" (Red-Strand) Wire Rope in the construction field.

Confidence in "HERCULES" (Red-Strand) Wire Rope is well-founded, as it is a product of long experience — designed and manufactured to do specific jobs better . . . safer . . . more economically. It is available in both Round Strand and Flattened Strand constructions as well as in Preformed and Non-Preformed types. There is —in this one grade—a right rope for every heavy duty purpose.

MADE ONLY BY
A. LESCHEN & SONS ROPE CO.
WIRE ROPE MAKERS
5909 KENNERLY AVENUE
ESTABLISHED 1857
ST. LOUIS, MISSOURI, U. S. A.

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THE G.I. SHOVEL WITH THE HIGH I.Q.

This Buckeye equipment will save on your post-war jobs!

Buckeye "Centro-lif" Bulldozers and Trailbuilders, Cable Control Units and other Tractor Equipment, Spreaders, Trenchers, Road Wideners, R-B Power Finegraders.

U. S. Coast Guard Photo.

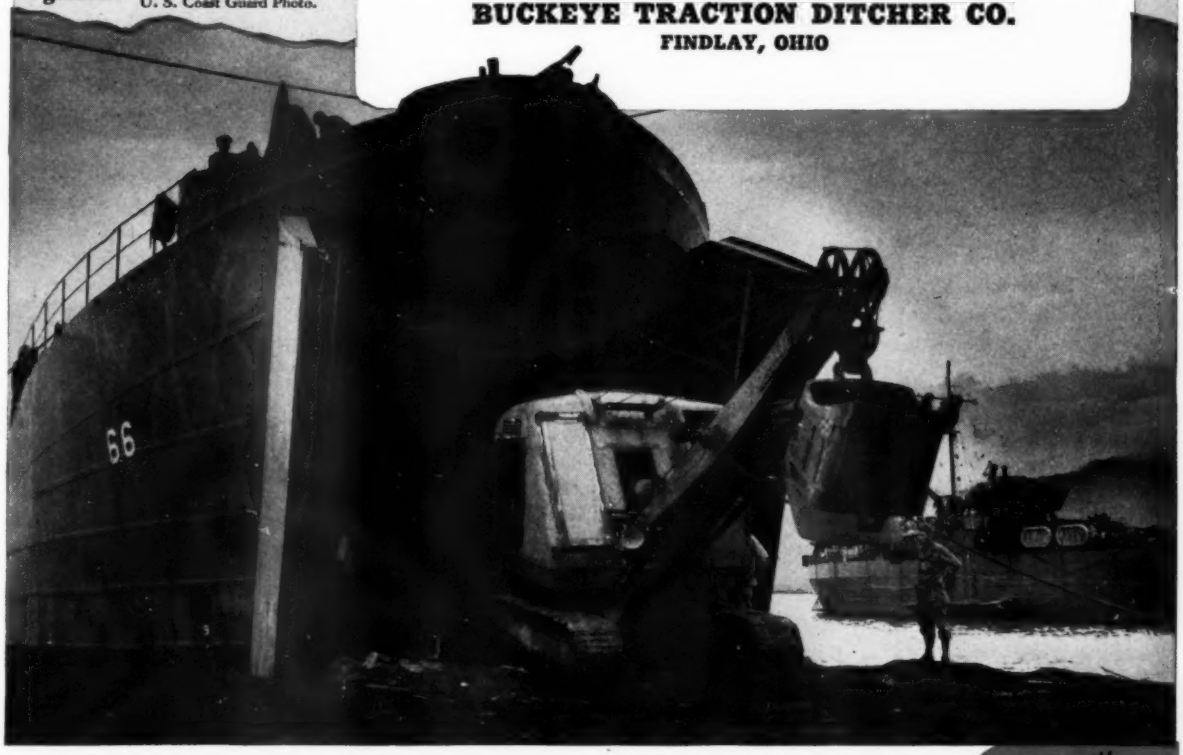
American construction equipment has become a potent weapon; is giving a good account of itself on every front. As always, some pieces of equipment are giving outstanding performance, and the Buckeye Clipper is one of them. The U. S. Army does not endorse any product—plays no favorites—which is fair all around. But men in the service, from our town and elsewhere, former shovel operators and even some of our employees in the service overseas, tell us what a swell job Clippers are doing. We quote:

> "You don't need a high I.Q. to run this G.I. shovel—it practically runs itself. Vacuum power control sure makes it easy to handle. It's easy to maintain, too. The guy who designed it sure felt for the 'Joes' on the maintenance end."

Well said, soldier! The trickle of Clipper repair parts going to operational bases bears out that last statement. Clippers are getting more abuse at the "fronts" than they ever got on construction jobs, in clay and gravel pits or in material yards, but they can take it.

We've had to put off a lot of people who wanted Clippers—war comes first. Those who are able to wait will find Clippers worth waiting for.

BUCKEYE TRACTION DITCHER CO.
FINDLAY, OHIO



Buckeye Clippers

CONVERTIBLE SHOVEL—CRANE—TRENCH HOE

with exclusive MEVAC METERED VACUUM POWER CONTROL

• English-built transit cranes lift the P-47 from the carrying frame of transport truck and the truck is driven from beneath the plane at an English airport to which the plane had been carried from a near-by port of arrival.
U. S. Signal Corps Photo

public construction," points out Carl W. Brown, president of the Association and chief highway engineer of Missouri, "yet highway agencies admit they are far behind in establishing the back-logs of projects they should have on hand.

Among the reasons cited by Brown for the lack of blueprints are manpower shortages, lack of active local interest, and delay on the part of the Federal Government in making known its plans on such matters as Federal highway aid.

Marshall County, Iowa, Adopts Road Program

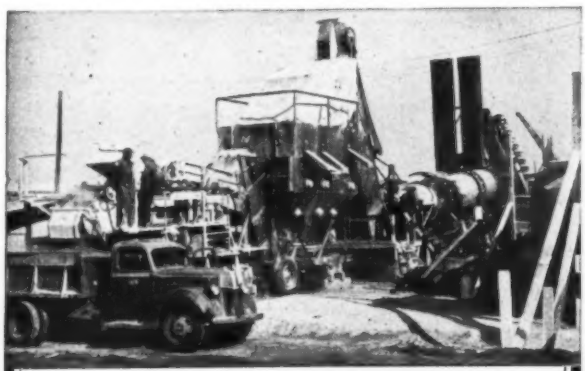
Marshall County, Iowa, has adopted and has received State Highway Commission approval of a three-year road construction program consisting of a total expenditure of $233,618.85. This program includes the following: surfacing, deferred application 51.69 miles, $14,433.11; surfacing, original application, 48.06 miles, $56,146.52, and bridges, culverts and grading, 48.81 miles, $153,039.22.

Great Lakes Shipment of Iron, Coal Breaks Record

A record-breaking total movement of iron ore and coal on the Great Lakes thus far this season was reported by the Office of Defense Transportation.

Ore movements from the opening of Great Lakes navigation up to May 22, 1944 totaled 13,297,099 tons, as compared with a total of 8,965,090 tons up to the same date in 1943, an increase of 4,332,009 tons.

The coal movement on the Great Lakes up to May 22 totaled 11,209,499



B-G Central Plant

★ Barber-Greene provides a complete, highly accurate, large volume plant for the production of every type of bituminous mix. The three basic units are mounted on pneumatic tires for maximum portability and minimum erection time.

The Barber-Greene booklet, "Versatility", completely describes the various setups of the mixer. It can be obtained from your Barber-Greene representative without obligation.

Q-31

BARBER GREENE
AURORA ILLINOIS

NEED A BIG Trailer?
La Crosse Makes Them Up To 200 Ton Capacity
WRITE OR WIRE
LA CROSSE TRAILER & EQUIPT. CO.
LA CROSSE, WISCONSIN U.S.A.

HAYWARD BUCKETS
USE RIGHT BUCKET FOR THE JOB
Hayward makes all four — clam shell, drag-line, electric motor, orange peel. A Hayward recommendation is unprejudiced.
THE HAYWARD COMPANY
52-54 Church Street
New York, N. Y.

This big bruiser is not as heavy as it looks (but it's tougher than it looks!)

Universal has led the field in eliminating dead-weight—we've done it again with the NEW "WRB" series *welded steel plate* crushers with cast steel pitmans. Not an ounce of excess metal, yet all the structural strength necessary to prevent distortion of frame or misalignment of bearings. Lateral and transverse ribbing and heavy plate side walls assure absolute stability.

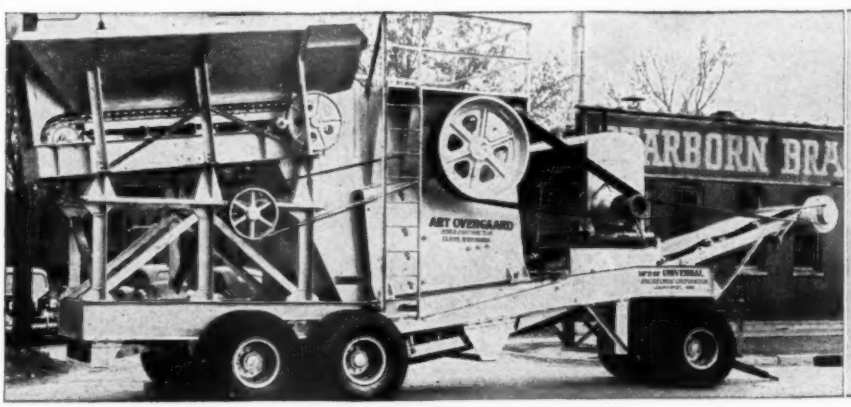
Four big SKF roller bearings—two on the pitman and one on each side—labyrinth sealed against grit and grease and Alemite lubricated, assuring freedom from bearing worries.

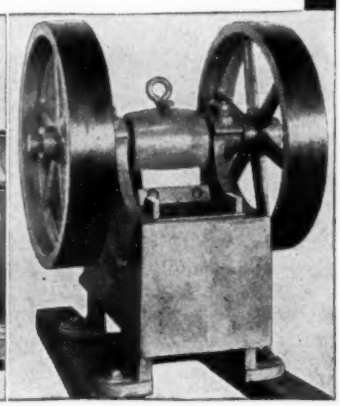
Two sizes available in the "WRB" series—30″ x 42″ and 20″ x 36″ feed openings; other sizes later.

A number of Universal "WRB" Crushers are in use. Users of the 30″ x 42″ report from 150 to 200 tons per hour of 4″ material. A 30″ x 42″ crusher on a primary crushing unit built for Art Overgaard, Elroy, Wisc. is shown below. Send for bulletin on the "WRB" line.

The overhead eccentric type jaw crusher, first built by Universal in 1906, has become the most widely accepted method for primary reduction of rock and gravel. While there have been improvements in materials, bearings and construction, there has been no major improvement in this basically sound method of crushing which provides two crushing blows with each revolution of the eccentric—a preliminary blow in the mouth of the crusher and a further reduction in the throat, at the bottom of the crusher. Some of these early crushers are still in use. The Universal "WRB" series employs this original highly efficient crushing principle.

UNIVERSAL ENGINEERING CORPORATION
610 C Ave. West **Cedar Rapids, Ia.**





ARMY NAVY

UNIVERSAL

CRUSHERS, PULVERIZERS, COMPLETE PLANTS, SPREADEROLLERS, PORTABLE ASPHALT PLANTS

Start Post-War Planning Now!

• Two Bucyrus-Erie Bullgraders close in on an inspecting jeep as they pioneer a military road on one of the Solomon Islands. Good, usable roads are playing an important part in slapping the Japs out of the Southwest Pacific.

tons as compared with 8,412,894 tons up to the same date in 1943, an increase of 2,796,605 tons.

ODT officials pointed out that the large increases over last year's movements are due principally to earlier opening of navigation and more favorable operating conditions on the Lakes this year. The opening of the season last year was the latest in many years, due to prolonged ice conditions in the spring.

Contractors' Pumps

Pumps have gone to War. Nearly 36,000 contractors' pumps were shipped during 1943 which was almost two and one-half times the number shipped in 1937, the earliest year for which comparable data are available. Shipments of centrifugal pumps in 1941, due to increased military requirements, more than doubled the four year (1937-1940) average of almost 12,000 and in 1943 rose again by 37 per cent over the 1941 total. The other types (diaphragm, triplex, plunger) showed comparable increases up to 1941 but declined slightly in 1943. Unfilled orders for centrifugal pumps during the period December 31, 1942-December 31, 1943 remained fairly stable. At the end of 1943 unfilled orders for the other types of pumps were nearly 50 per cent greater than the shipments for that year.

These data are based on reports from 17 producing companies and represent approximately 100 per cent of the industry.

Brown in Coast Guard

George F. Brown of Woodside, L. I., N. Y., a member of Local No. 14, International Union of Operating Engineers, in addition to working in the Brooklyn Navy Yard, is 2nd Class Machinist Mate in the U. S. Coast Guard Reserve and a deputy game protector. He writes that he is repairing marine engines at Staten Island base.

Authorize Raise in Ready-Mix Concrete Ceiling Prices

Manufacturers of ready-mixed concrete in the northeastern States may add to their established ceiling prices the dollars-and-cents amount of increased cost resulting to them from the April 20, 1944, increase granted to Portland cement manufacturers in that area, the Office of Price Administration announced. Only the actual increase in the cost of cement may be added by ready-mixed concrete producers, OPA stressed.

The area in which the adjustment (effective June 10, 1944) applies is limited to the states of Maine, Vermont, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, eastern Pennsylvania, Maryland, Delaware, District of Columbia, the city of Alexandria, Va., and five counties in northern Virginia.

Data received from producers of ready-mixed concrete in the area indicate that they are unable to absorb the increased cost of Portland cement, OPA said.

Michigan Working on Postwar Highway Plans

The Michigan State Highway department has put 24 survey crews at work gathering data needed for drawing plans for the $96,000,000 worth of projects on its post-war list, according to Charles M. Ziegler, commissioner. Nearly 100 men are working day and night drawing plans for these projects and preparing the mass of detail that must be completed before a project is ready for the construction stage.

Commissioner Ziegler announced that the Public Roads Administration has approved the highway department's request for $221,700, representing the federal government's share of the cost of making surveys for 37 Michigan postwar highway projects, this amount to be matched by the state out of its share of $50,000,000 appropriated by Congress, July 13, 1943, for postwar planning.

The highway department is also asking the PRA for an additional

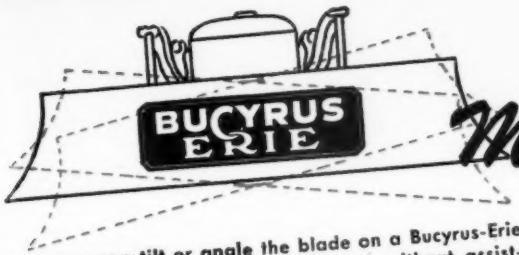
on ROGERS TRAILERS

TODAY even airplanes "bum a ride" on ROGERS TRAILERS. Deck houses for Victory ships . . . huge coastal defense guns . . . giant tanks, all are speeded towards completion and rushed to the fighting fronts on ROGERS TRAILERS.

In War and in Peace ROGERS TRAILERS have proven their ability to "deliver the goods". New models which will be available when war contracts are completed will be even better-engineered . . more efficient than the thousands which have been used successfully by industry for many years.

EXPERIENCE *Builds 'em* PERFORMANCE *sells 'em*

ROGERS BROS. CORPORATION
ALBION,
PENNA.



Make the TILT Work for YOU

One man can tilt or angle the blade on a Bucyrus-Erie Bullgrader in just a few minutes time without assistance. That's why it's so easy to take advantage regularly of blade tilt to do your work in the fastest and most efficient way possible. Here's how you can use the tilt:

1 **WHEN TRACKS MUST TRAVEL ON A SLOPE AND YOU WANT TO ESTABLISH A LEVEL CUT:** Tilt in with the advance corner low, which starts a leveling cut and throws the material out along the angled blade, overcasting the excavated material. As tracks move onto the section you have notched into the bank and filled on the slope, continue with the tilted blade only long enough to get tracks on the desired grade level. Then adjust back to a level blade but continue to lead with the inside corner in order to plow the material out to fill on the side slope.

2 **WHEN TRACKS MUST TRAVEL ON THE LEVEL AND YOU WANT TO ESTABLISH A SLOPING CUT:** With front corner tilted down, take a cut along the centerline of your ditch until you have a track length. Then level the blade and, working your tractor on the slanted bank, continue to angle your material up the slope and into your spoil pile. If you are opening a V-ditch, repeat on the opposite side at proper slope to make the desired cut.

3 **PEELING (OR SLOPING DOWN) VERTICAL OR STEEP BANK:** Tilting the forward corner of the blade up and raising it high, use the end to "peel" or shave off the material. Continue the operation until you bring the bank to the desired slope, or until you have a slope on which the tractor can operate.

Find out about the complete line of Bucyrus-Erie Tractor equipment from your nearest International TracTracTor distributor. There are blades, scrapers, rippers, rollers, and grubbers that will give you speed and economy.

In all blade work, reduce backing up moves whenever you can. Plan a possible work to dig both ways not only to apply more of your tim to moving dirt, but also because excessive back-up makes for excessiv tractor maintenance.

N5

BUCYRUS ERIE TRACTOR EQUIPMENT

SEE YOUR INTERNATIONAL TRACTRACTOR DISTRIBUTOR

• Bucyrus-Erie ¾-cu. yd. shovel loads truck in construction of a hauling road out of a mine of the Blue Ridge Mining Co. at Cartersville, Georgia.

$231,000 to be made available on the same matching basis for financing surveys and plans on another 39 postwar highway projects.

If the second request is granted, matching of this money by the state highway department will make available a total fund of $905,400 for surveys and plans on the 76 projects listed. These projects would involve a total construction amounting to $35,060,000 and would provide 518.6 miles of new roads and 45 bridges and grade separations.

West Coast Highway Gets Approval

WPB approval for the immediate completion of the Idaho-Oregon-Nevada highway is expected to be of tremendous importance to Idaho farmers in marketing their products. The project, all in Oregon, near the Nevada line, provides for new construction on 13 miles and resurfacing of an additional 47 miles. It extends northward from Scotts Butte, Oregon, near the Nevada border in the vicinity of Jordan Valley and will provide a more direct route between Idaho and Oregon production centers for transportation of food supplies and war equipment to California points.

Castle Dome Loads Out 1,714,205 Tons in 6 Months

The Castle Dome Copper Co., a wholly owned subsidiary of the Miami Copper Co., loaded out 1,714,205 tons of ore assaying 0.612% copper during the last six months of 1943. The concentrates from the milled ore assay 21.04% copper, tails .071% copper. The low-grade copper property was stripped and laid out for bench mining with benches 40 feet high.

Louisiana Reports on Postwar Highway Activity

By HARRY B. HENDERLITE

(Chief Engineer)

For the past year the Department has been cooperating with the United States Public Roads Administration in making studies and preparing plans for postwar construction. The general purposes to be served by planning at this time are to prepare for the immediate resumption of highway construction activities after the war because of the very urgent need for highway improvement and to alleviate the severe unemployment problems which may come after this war.

Before the end of the war there probably will be over 200,000 citizens of Louisiana in the armed forces. Many other citizens will be engaged in some activity directly connected with and supported by military operations. It now seems clear from experience that a large number of those people, when military operations and munitions manufacture terminate, will not find waiting a ready means of livelihood unless such a means is planned and prepared in advance.

Fortunately those areas where the improvement of highways is most urgent are those areas where the concentration of unemployment will exist. Thus the means for the relief of unemployment, by the construction of highway and street improvements, will exist co-extensively with pools of unemployed available to undertake such construction.

To finance the economic and engineering studies and the making of surveys and preparation of plans for postwar highway and street improvement projects and to finance the postwar construction of those projects, two Federal Acts of authorization and appropriation have already been passed

SUPER-ABILITY of the Versatile DUCK

Like the amazing duck that performs on land or water Owen Dredging Buckets are designed to withstand the special difficulties of under water service or the most severe kind of digging on land. Protection of bearings against water and grit is a feature. Write for literature

THE OWEN BUCKET CO.

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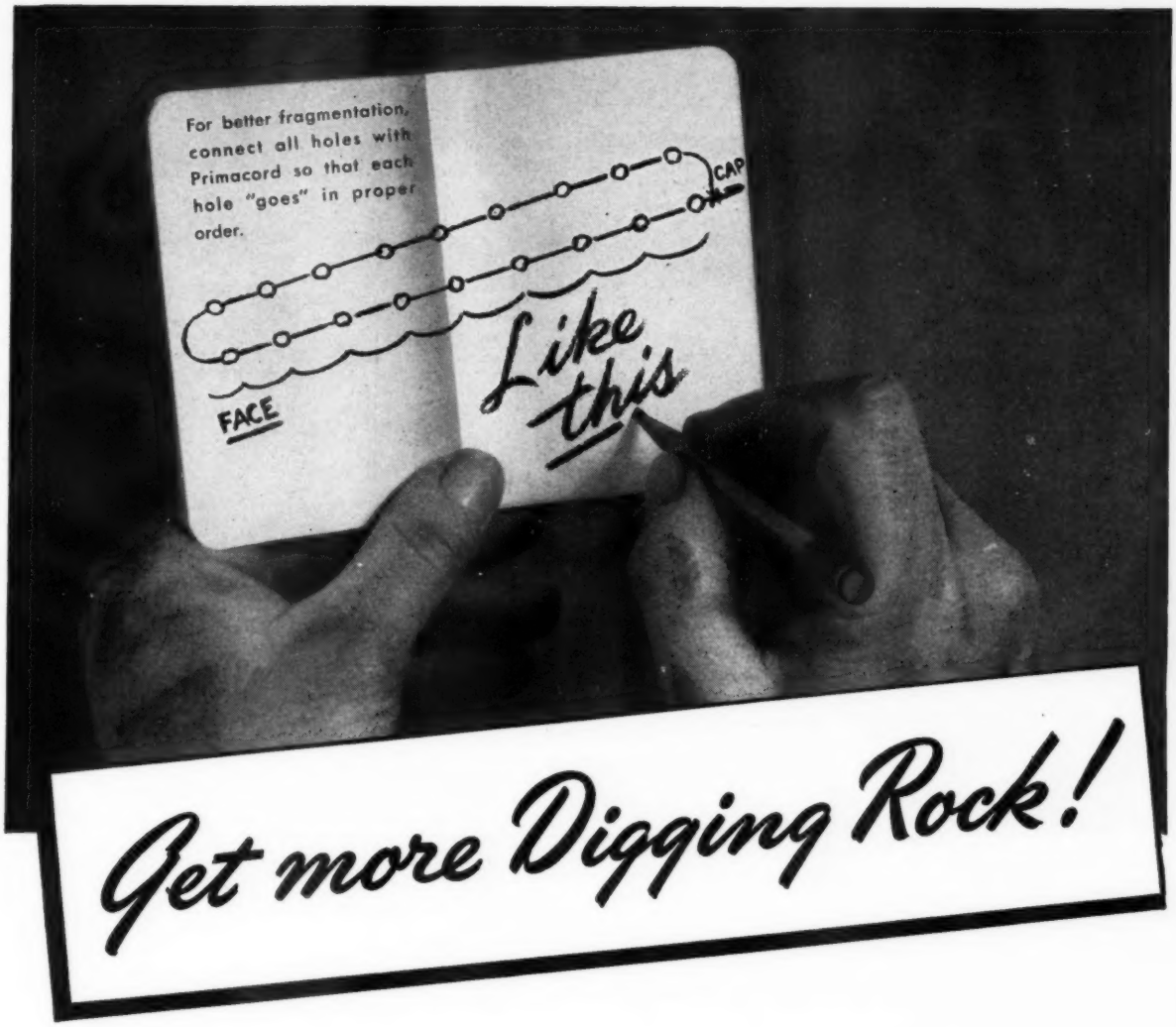
BRANCHES: New York, Philadelphia, Chicago, Berkeley, Cal.

OWEN BUCKETS

A MOUTHFUL AT EVERY BITE



Get more Digging Rock!

A continuous length of Primacord, running from top to bottom of each hole, will detonate every cartridge in that hole. This is known as the "branch" line.

Each branch line extends above the top of its hole, and is connected *at right angles* to the main or "trunk" line of Primacord.

Trunk lines should connect all holes *in rotation*, so planned that the holes nearest the face will "go" first. In this way each hole can be loaded to handle its own burden, and produce proper fragmentation.

One detonator is used at the end of the trunk line, and this is applied after all loading and hook-up has been completed.

Send for the Primacord Book.

PRIMACORD-BICKFORD

Detonating Fuse

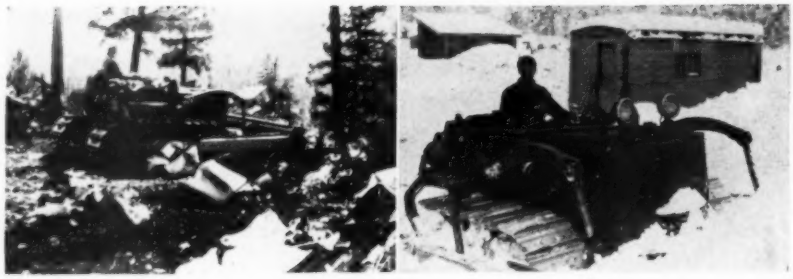
Manufacturers of Safety Fuse since 1836

THE ENSIGN-BICKFORD COMPANY • SIMSBURY, CONNECTICUT

and another Act is now being sponsored by the American Association of State Highway Officials and is before the Congress for public hearings.

The first Act passed was Public 295 of the 77th Congress and the apportionment of funds to Louisiana under this Act are $147,961. These funds must be matched in equal amount by state funds so that the total available for the economic studies, surveys and plans is $295,922. As of September 22, 1943 the funds available to the state under this Act had been programmed and allocated to the program items and projects planned by the highway department.

The second Act passed was Public 146 of the 78th Congress and the apportionment of the funds made available to Louisiana was $756,893 which are to be matched by the state. Under this Act, therefore, the total available for the prosecution of economic and engineering studies, making of surveys, and preparation of plans is $1,513,786.00.



• **Edward C. Johnson of Troy, Montana, keeps his International TD-9 tractor and Bucyrus-Erie bulldozer busy the entire year. In the Spring, when not busy skidding logs and building logging roads, Johnson picks up odd jobs such as leveling the city dump (left) and city street and county road snow removal work. The dump is levelled once a year and the material is moved about 100 feet. The snowfall was 3½ feet when the snow removal picture was taken.**

The funds available from these Acts have the explicit reservation that their use will result in complete final plans and contract documents. These funds have not yet been allocated to individual projects but have been programmed in accordance with the regulations of the Public Roads Administration.

The P.W.I. (Economic investigations for postwar construction) part of the program is not required to be distributed among projects because projects have but a linear control while P.W.I. studies usually embrace an area. These P.W.I. funds, therefore, are assigned to finance the general studies and activities of the Department's Traffic and Planning Section.

The P.W.S. (Surveys and plans for postwar construction) part of the program has been tentatively allocated to the following program items which are not individual projects but probable groups of projects in the larger urban or metropolitan areas of the state:

City Area	First Partial PWS Program	Second Partial PWS Program	Totals
New Orleans	$ 9,050.00	$169,418.00	$178,468.00
Alexandria	101,530.00	26,110.00	127,640.00
Baton Rouge	31,112.50	76,817.50	107,930.00
Shreveport	102,620.00	155,045.00	257,665.00
Lake Charles	——	31,822.00	31,822.00
Monroe	41,450.00	48,200.00	89,650.00
Totals	$285,762.50	$507,412.50	$793,175.00
Other	7,400.00	——	7,400.00
Grand T't'l	$293,162.50	$507,412.50	$800,575.00

The Federal legislation designed to provide funds to finance postwar construction of highway improvements, known as H.R. 2426, provides $1,000,000,000 annually for each of the three years following the termination of the war and the funds so provided will be opportioned to the several states by a

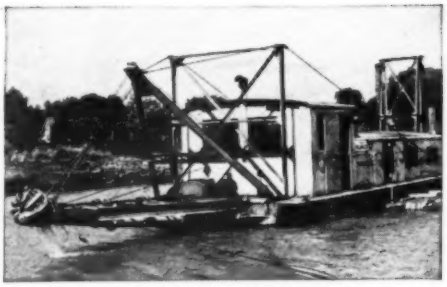
ASD DREDGING EQUIPMENT

HYDRAULIC - DIPPER - CLAMSHELL

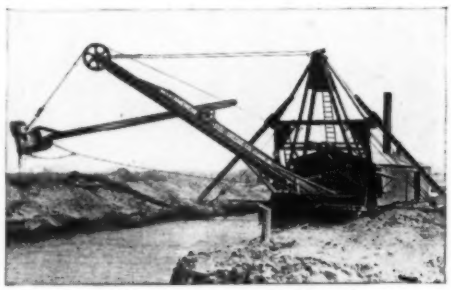
Complete integrated units, each designed for specific performance.

Bolted sectional steel hulls, power and pumping units, spuds, frames, ladder or booms are shipped by truck, rail and/or as hold cargo. May be easily assembled at inland site and dismantled for relocation after project is finished.

ASD dredges are backed by 40 years of dredge engineering and operating experience.



HYDRAULIC DREDGES
Sizes 8 inches up



DIPPER and CLAMSHELL
¾ cu. yd. up

We invite inquiries now for post-war delivery.

Write for catalog, photos and data sheets.

AMERICAN STEEL DREDGE CO. INC.
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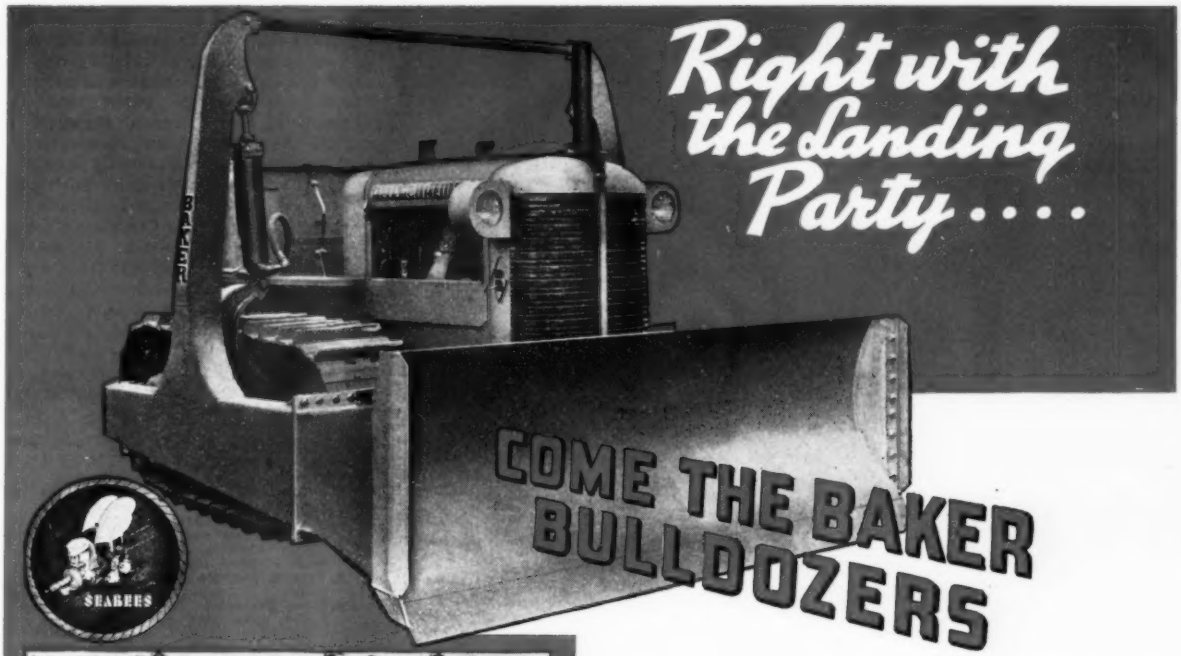


Baker Bulldozer on Allis-Chalmers tractor spreading, leveling and compacting sand on jetty for unloading supply ships; South Pacific.

Baker spreads material for another type of jetty to facilitate landing of barges.

Bulldozers are not fighting equipment. They pack no artillery—they have no protecting armor plate. They don't even enjoy pet names like "Lulu Belle" or "Memphis Mamma," but they are in there—pitching!

Baker Bulldozers are doing all right backing up the Yanks in every theater of war. You will find them right behind the fighting men — filling shell holes—leveling cratered air fields—excavating for underground oil tanks and ammunition dumps—building landing docks—digging drains and fox-holes—making themselves useful to the fighting men. Their aid in consolidating positions on beach heads, mountain sides or sand dunes is hard to over-estimate.

Commanders of task forces have learned that it is almost as important to have bulldozers as tanks in the holds of their LST ships. Bulldozers have won their spurs and Baker Bulldozers, because of their fast, positive hydraulic control, dependability and rugged design stand high on the honor roll.

It's true that supporting our fighting forces is a full time job for Baker Bulldozers *NOW*. But just as soon as our enemies are vanquished, you will find the Baker ready to perform equally notable feats on your contracts. Send for a copy of "Unsung Heroes of War."

THE BAKER MFG. CO.
504 Stanford Ave.
SPRINGFIELD, ILL.

BULLDOZERS SNOW PLOWS **BAKER** CONSTRUCTION EQUIPMENT

• Muskeg was not the only thing that contractors working on the Alaskan Highway had to contend with as this picture of a Cleveland DR-30 wagon drill at work on the highway indicates.

formula similar to that of Federal legislation enacted in 1916, but in which the respective ratios will be ½, ¼ and ¼. The amount that will be available to Louisiana for each of the postwar years is $15,804,600. The Federal funds are to be matched by $1.00 state funds for each $3.00 of Federal funds so that the total that will be available annually to Louisiana will be $21,072,800 and the total for the three years will be $63,218,400. It will be noted that the amount of state funds required to match the three years' appropriation will be $13,804,600. Presently available to provide these funds is an authorization of the Legislature of Louisiana and an amendment to the Constitution providing for a bond issue of $10,000,000, and there are also available from a previous authorization and constitutional amendment unissued bonds in the amount of $1,400,000.

To utilize the state funds made available by bond authorizations, and the Federal funds which they will match, it is estimated that the actual needs for postwar improvements in Louisiana are as follows:

A. BETTERMENTS. (New construction and improvements)	
1. Buildings, headquarters and district offices and shops	$ 1,000,000
2. Urban Projects, freeways and limited access design	100,000,000
3. By-pass projects limited access design	5,000,000
4. Rural Projects	
a. Two Lane hard surfaced highways	25,000,000
b. Two additional lanes to existing two-lane hard surfaced highways	35,000,000
c. Two lane hard surfaced highways for medium traffic	10,000,000
Total	$176,000,000
B. REPLACEMENTS. (Reconstruction and major repairs)	
1. a. Retreading and sealing two-lane medium traffic highways	$ 3,000,000
b. Reconstructing two-lane medium traffic highways	10,000,000
2. Metal surfaces (gravel and shell) — Two-lane light traffic highways	6,000,000
3. Timber bridges.	
a. Reconstructing 200,000 linear feet	10,000,000
b. Repairing 400,000 linear feet	4,000,000
Total	$ 33,000,000
C. AUTOMOTIVE and other mobile units	1,000,000
Grand Total	$210,000,000

The capital investment required to furnish employment for one man for one year has not been satisfactorily and finally determined from our records, but preliminary studies seem to indicate that the capital investment required to produce employment equivalent to one man-year will be approximately $3,000, so that approximately a capital investment of $210,000,000 will produce 70,000 man-years of employment or 23,333 man-years for each of the three postwar years.

Although not particularly pertinent to this report, estimates are now being made of the capital value of the present state highway system and while these figures may vary substantially from the final inventory, the following are offered in order to give a rough idea of the value of the highway system in the state:

2,500 miles	at	$40,000 per mile	$100,000,000
1,500 miles	at	20,000 per mile	30,000,000
10,000 miles	at	10,000 per mile	100,000,000
20,000 miles	at	5,000 per mile	100,000,000
34,000 miles			$330,000,000
Major Bridges			20,000,000
Street Systems in cities and towns			100,000,000
Grand total			$450,000,000

Economic studies in the form of

HAFTRAKS • TRAKTRAILERS
LINN
CONTOUR-FOLLOWING TRACTION
are carrying loads in all climes where off-the-highway operation is required.
• Ruggedly constructed and amply powered for the toughest going.
• From 5 to 20 tons capacity.
THE LINN MANUFACTURING CORPORATION
MORRIS, NEW YORK

MISSISSIPPI WAGON

NOW IN PRODUCTION

BIG NEWS FOR CONTRACTORS

The MISSISSIPPI WAGON is in the news again! Production is under way on new MISSISSIPPI WAGON hauling units, complete with tractors. They are being manufactured in the following sizes:

Model 75— 9½ yards heaped capacity.

Model 85—10½ yards heaped capacity.

Model 120—15 yards heaped capacity.

Model 75 is designed strictly for construction work. Model 85 is designed for topping contractors; also hauling gravel for state highways, counties, cities and similar users, for long haul work. Model 120 is designed for coal hauling and other light-weight materials. All models have a maximum payload of 26,000 pounds.

The three models of MISSISSIPPI WAGONS are each powered by the M-R-S Manufacturing Company Special International Diesel Wheel Tractor of 72 Horsepower.

THE WORLD'S MOST MODERN HAULING UNIT CAN MAKE MONEY FOR YOU BECAUSE:

The MISSISSIPPI WAGON has maximum tractive ability for bad going at slow speed without paying the penalty of the pounding and surging of the heavy trailer on the tractor during the high speed portion of the cycle.

This is accomplished by a finger tip control that actuates the hydraulic cylinder between the rear of the tractor and the front of the trailer, thereby causing the transfer of sufficient weight from the trailer to the tractor to secure the maximum tractive effort of the tractor.

NO PART OF THE WEIGHT OF THE LOADED TRAILER is on the tractor except when needed for traction purposes.

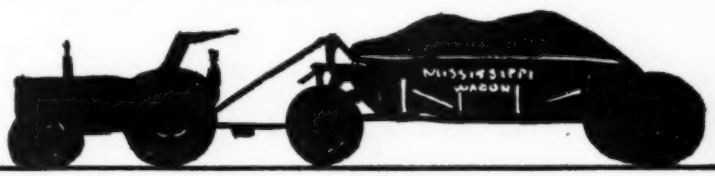
Since the tractor is not subjected to the pounding and surging of the heavy trailer at high speeds, repairs are held to the minimum.

The tractor can be quickly detached and used for other work, such as pulling sheepsfoot rollers, rubber tired rollers, etc.

Only 12 pounds of air is necessary in the four drive tires of the tractor, insuring good tractive effort after the load is dumped or when the tractor has been detached and is being used for other work.

The repairs necessary to keep the MISSISSIPPI WAGON in operation are small in quantity, and unbelievably low in price.

Contact your nearest International Industrial Power Distributor for the complete facts about the MISSISSIPPI WAGON, the world's most modern hauling unit.



M-R-S

Manufacturing Co.

JACKSON, MISSISSIPPI

special traffic surveys and origin and destination surveys have been completed for the Lake Charles, the New Orleans, the Shreveport and the Baton Rouge areas. Still to be completed are such studies for the Alexandria and the Monroe areas. Engineering surveys have been started in the Shreveport and in the Baton Rouge areas and have been completed for one project in the Lake Charles area. Design of one bridge in the Lake Charles area has progressed substantially. At present we are handicapped in making better progress in conducting surveys and preparing plans by the lack of engineers to perform the field work and of designers and draftsmen to prepare plans. Nevertheless it is expected that plans and contract documents for a substantial group of projects will be available at the termination of the war.

Investment of $900,000,000 In U. S. Irrigation

"The Treasury of the United States today, through the Bureau of Reclamation, has an investment in irrigation and related projects of more than $900,000,000," Commissioner Harry W. Bashore of the Bureau of Reclamation told the Senate Commerce Committee meeting on the Rivers and Harbers Bill.

He told of how the Federal government assumed sponsorship for irrigation on the passage of the Reclamation Law in 1902 as a means of stabilizing the agriculture of the West, of developing the arid regions, and of providing homes for pioneer settlers. A first consideration in the enunciation of the Federal policy was that construction costs of irrigation should be repaid by beneficiaries.

In recounting the work of the Bureau, Bashore gave the following information:

Fifty-two projects have been completed by the Bureau of Reclamation and 20 others are still under construction. Each is based on the conservation and consumptive use of the waters in the western streams.

Four million acres of land now are served by the Federal Reclamation systems. The total will be increased to 12,000,000 acres upon completion of projects now under construction, upon which construction will be resumed at the close of the war, or which has been authorized for construction. The hydroelectric power installations at Reclamation projects exceed 2,000,000 kilowatts. Valuable as is irrigation, many of the Reclamation projects require the aid of power to render them economically feasible.

To Construct Irrigation Facilities on 7,520 Acres

The construction of irrigation facilities on 7,520 acres of land on the Balmorhea project in Reeves County, Texas, has been authorized by the President, Secretary of the Interior Harold L. Ickes announced.

Clearance for this work was given the Bureau of Reclamation by the War Production Board in January, to be done under the Water Conservation and Utilization Act of 1939, after being recommended by the War Food Administration.

Subject to the acquisition of additional water rights from Phantom Lake Spring to supplement supplies now available, the Bureau of Reclamation will reconstruct the Phantom Lake Canal, line it with concrete to prevent excess seepage, repair the Madera Diversion Dam, and modernize the existing canals and laterals to carry the increased amounts of water. The project improvements are estimated to cost $347,000.

Soviet Scientific Expeditions Set for Exploration Trips

A Soviet home broadcast reported May 12 by United States Government monitors said that 272 scientific expeditions, organized by groups affiliated with the Academy of Sciences of the U.S.S.R., would set out in the near future to explore the Urals, the Far

"The winner of this war will be the side that moves the greatest amount of dirt in the shortest possible time"

That statement, by a high-ranking officer in the South Pacific area, is graphic proof of the wartime importance of excavating machinery.

Moving dirt—or rock, sand, mud, gravel, shale, coal, coral, snow and ore—fast and efficiently, is a specialty of General-built equipment. And these excavating machines have the built-in stamina, power and adaptability to "go the distance in any kind of going."

You can see the evidence today on a global scale, all as a part of one big job . . . winning this war.

"That goes for the winners of Post-Victory Business, too."

"Civilian Generals," Excavators and Supercranes with long outstanding records, are busier than ever here at home. This performance, and that of their counterparts overseas, has contributed to the blueprints for the all-purpose revolutionary Machine of Tomorrow—

THE GENERAL TYPE 10

WRITE TODAY TO BE READY FOR RECONVERSION DAY!

THE OSGOOD COMPANY
SHOVELS, DRAGLINES CRANES
CRAWLER & WHEEL MOUNTS
DIESEL, OIL, GAS, ELECTRIC

Associated with The Osgood Company

GENERAL EXCAVATOR CO.
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GENERAL
CRANES, DRAGLINES AND SHOVELS
DIESEL, GAS, ELECTRIC

• LeRoi motor powers cement mixer used by U. S. Army Engineers in the construction of an airfield in the Southwest Pacific area. Paper cement bags in the lower right contained Australian Portland cement.

U. S. Signal Corps Photo.

East, the Republics of Central Asia, the Caucasus and the Far North.

According to the Moscow broadcast, one group will "investigate the sources of iron, manganese, cobalt and chromium" in the Kazakh Soviet Socialist Republic in central Asia, and another group the "sources of zinc and rare metals" in the Ural Mountains.

In addition, the Far Eastern Base of the Academy of Sciences is scheduled to send a geological expedition into the "deep regions" of the Siberian maritime areas, the broadcast said.

Future State Highway Debt Service Requirements

Comprehensive data on future state highway debt service requirements, not including any highway debt for which the state is not directly responsible and also not including quasi-state highway developments that are not included in state highway systems, such as the Golden Gate Bridge, Pennsylvania Turnpike, highway facilities of the Port of New York Authority and others less widely known, indicate that the aggregate state debt for highways was $1,737,057,000 on December 31, 1942. Of this amount, $1,723,642,000 was for roads and bridges on the state systems, and the remainder, $13,415,000, was for construction on county and local highways.

Reserves for principal totaling $199,713,000, when offset against the gross debt, reduce the net debt to $1,537,344,000. Since the grand total of retirement reserves was practically unchanged during the year, the reduction in both gross and net debt was slightly in excess of a hundred million dollars.

All state highway obligations were current in both interest and principal as of December 31, 1942, which has been true for many years. The current rate of income from highway-user taxes, even in the states with relatively large highway debt, makes it seem improbable that any state will have to use other than normal sources of revenue to meet highway debt service requirements in the next few years, according to Public Roads Administration, who compiled the information.

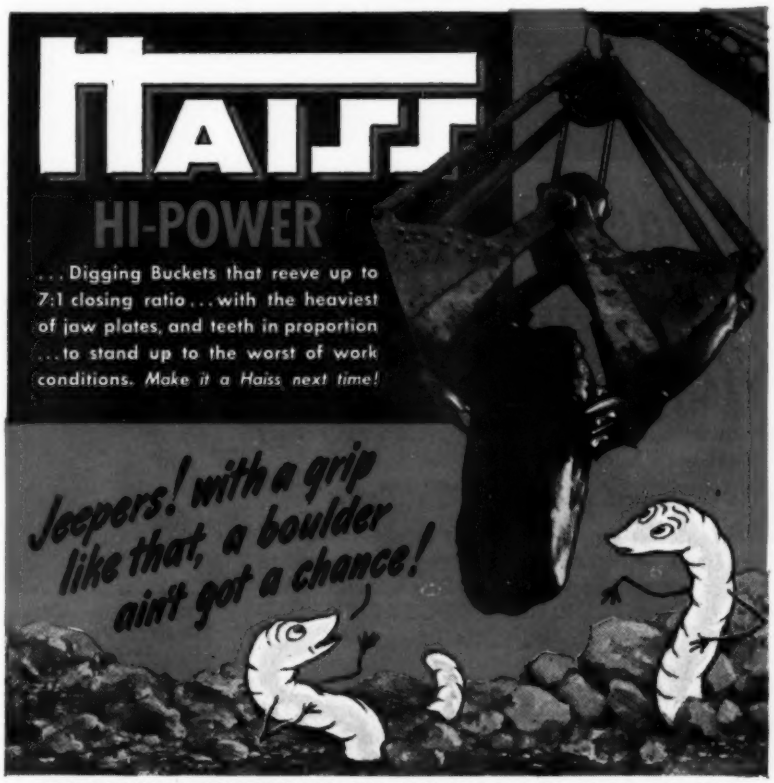
Report on Fluorspar Mining Industry at Meeting

A preview was submitted of December and January production, consumption, import and stock figures at a recent meeting of the Fluorspar Mining Industry Advisory Committee. H. T. Mudd, Chief of the Fluorspar and Magnesite Section of the Mica-Graphite Division, who presided at the meeting, pointed out that there has been an increase of 7,000 tons in the production of metallurgical grade in the November 1943 and January 1944 period over the same period in 1942-43. At the same time there was a slight decrease in consumption.

Production in 1944 should total more than 500,000 tons, according to estimates obtained from reports on WPB Form 2039 made by producing companies. Of the total production, 294,164 tons will be of metallurgical grade.

Mr. Mudd pointed out that there has been little change in the ore reserve of acid producers, but on the other hand, the position of metallurgical producers has improved. Manpower is still short, he said, and the use of women in the industry was discussed.

The acquisition of government stocks to prepare against possible emergencies was examined. Mr. Mudd said that sufficient metallurgical stocks should be built up by the end of 1945 at present rates, but acid production is still insufficient to permit accumulating any additional supplies.


HAISS
HI-POWER
...Digging Buckets that reeve up to 7:1 closing ratio...with the heaviest of jaw plates, and teeth in proportion ...to stand up to the worst of work conditions. Make it a Haiss next time!
Jeepers! with a grip like that, a boulder ain't got a chance!

GEORGE HAISS MANUFACTURING CO., INC., 144th St. & Park Ave., New York 51, N. Y.
Bucket agencies throughout the country. Write, wire for prices, delivery or catalogs.

OBITUARIES

MATTHEW FRANCIS KEESE

Matthew (Matt) Francis Keese, manager of Bucyrus-Erie dredge sales, died May 24th. He was born in Republic, Michigan, in 1886 and moved to South Milwaukee, Wisconsin, in 1895 where he graduated from the local high school in 1901.

In 1902 Mr. Keese started to work for Bucyrus-Erie Co. in the blueprint room. He later received a degree from the University of Wisconsin after completing in three semesters a special engineering course for adult students.

In 1928, after a thorough background in the design and construction of dredges, he assumed charge of dredge sales for the company and stayed in this division until his death.

Mr. Keese was an active civic leader in his community and had a fine sense of humor. He did a considerable amount of travelling and his work brought him to England, Alaska, Panama, Holland, Santo Domingo and all the principal cities in United States and Canada. A log kept during the last 20 years revealed that he had travelled about 760,000 miles by railway, planes and ships in the course of his sales work.

He is survived by his widow (nee Margaret Rouse), whom he married in 1910, and five sons: William and Matt, Jr., employed in Bucyrus-Erie South Milwaukee plant; Robert of LaCrosse; Technical Sgt. John of the Marine Corps base at Corvallis Field, and Lt. James Keese, a Marine Corps pilot who was announced missing in action in the South Pacific the day preceding burial of his father.

C. K. ORDWAY

Mr. C. K. Ordway, 51, district manager for Pioneer Engineering Works of Minneapolis, died of a heart ailment on May 27.

Mr. Ordway had been selling construction machinery for about a quarter of a century. He started with the Northfield Iron Works. In 1922, he went to work for Russell-Grader Manufacturing Company. In 1928, he was one of the first salesmen to go on the road for the Pioneer Engineering Works. His work has taken him to almost every state in the Union.

HENRY L. HOWE, Jr.

Henry L. Howe, Jr., 56, president last year of the American Public Works Association, died May 31 of a heart attack in his home in Rochester, N. Y., where he was city engineer.

An expert in asphalt paving, Howe invented a machine for lifting samples of pavement for testing. He was credited with several papers published by the American Association of Paving Technologists.

Mr. Howe was born in Canandaigua, N. Y., and after receiving his early schooling there, was graduated from Cornell University. Except for two years' active service with the Navy during the last war, he had served the Rochester city engineering department since 1914 and had been its head since 1938. He was a lieutenant commander in the Naval Reserve until his retirement in 1941.

Surviving are three sons, Ensign Henry Lawrence Howe, Seaman Second Class Curtis Burton Howe and Apprentice Seaman Richard Smith Howe, all of the Navy.

WELLMAN Williams Type BUCKETS

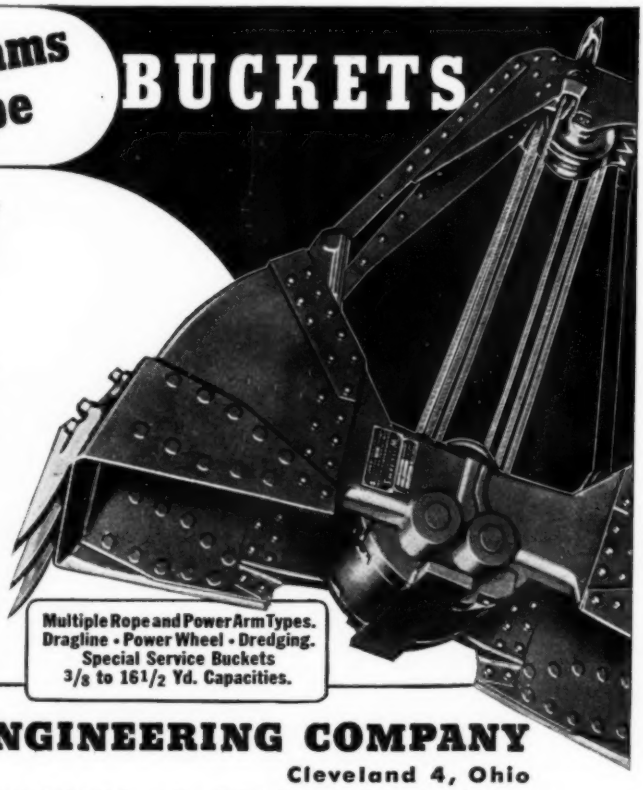
Welded Rolled Steel

FOR GREATER STRENGTH AND LONGER SERVICE

Wellman Buckets combine all the mechanical advantages of the famous Williams Bucket with the welded construction features formerly found in Wellman custom-built heavy duty steel mill buckets.

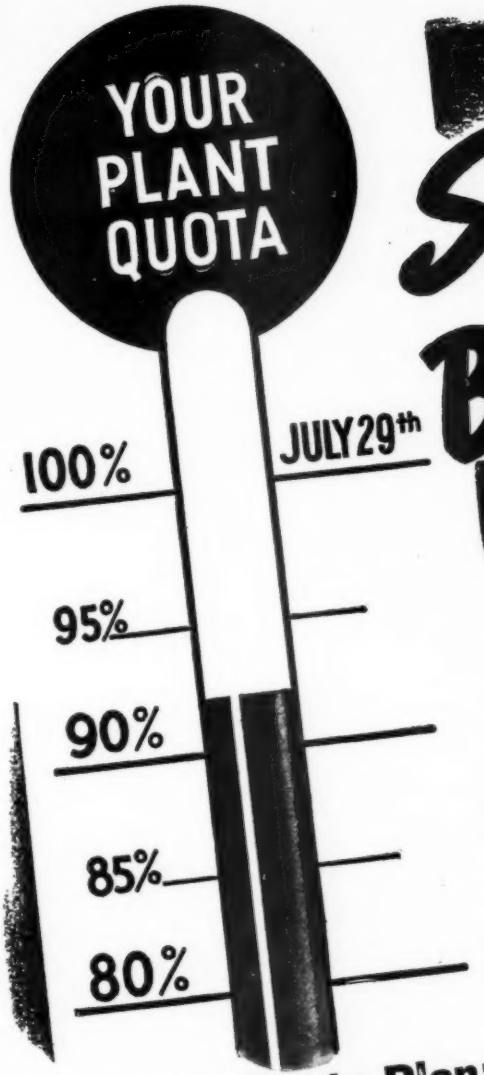
Send for Free Bulletin

Tell us about your particular requirement and we will send full description of construction and features in special bulletins which clearly prove why YOUR NEXT BUCKET SHOULD BE A WELLMAN-WILLIAMS.



Multiple Rope and Power Arm Types.
Dragline • Power Wheel • Dredging.
Special Service Buckets
3/8 to 16 1/2 Yd. Capacities.

THE WELLMAN ENGINEERING COMPANY
7002 Central Avenue Cleveland 4, Ohio
SALES AND SERVICE AGENCIES IN PRINCIPAL CITIES



Stay at Your Battle Stations!

MANAGEMENT • LABOR

—the 5th War Loan Drive is still on.

July 29th is the last pay day in the Drive.

The U. S. Treasury has set the overall goal at $16,000,000,000 —$6,000,000,000 from individuals alone. This is the biggest sum ever asked of the American people—*and it must be raised!*

Keep fighting. The 5th War Loan is a crucial home front battle of tremendous importance to the total war effort.

Tighten up your 5th War Loan Drive organization. Step up your solicitation tempo. Drive! Drive!! Drive!!! Hit your Plant Quota's 100% mark with a bang that'll proclaim to all the world that the U. S. Home Front is solidly in back of the Fighting Front.

Need help? Need ideas? Call on the Chairman of your War Finance Committee. He's standing by.

Here's the Quota Plan:

1. Plant quotas are to be established on the basis of an average $100 *cash* (not maturity value) purchase per employee.
2. Regular Payroll Savings deductions made during the drive accounting period will be credited toward the plant quota.
3. Employees are expected to contribute toward raising the cash quota by buying extra 5th War Loan Bonds: 1—Outright by cash. 2—By extra installment deductions. 3—By extra installment deductions plus cash.

Example: JOHN DOE MFG. CO.—1,000 Employees

1,000 Employees x $100 . . . $100,000 Cash Quota

Regular payroll deductions during the eight weekly payroll accounting periods of June and July. 30,000

$70,000 (to be raised by sales of extra Bonds).

BACK THE ATTACK—SELL MORE THAN BEFORE

The Treasury Department acknowledges with appreciation the publication of this message by

Excavating Engineer

★ ★ *This is an official U. S. Treasury advertisement—prepared under the auspices of Treasury Department and War Advertising Council.* ★ ★

Field NOTES

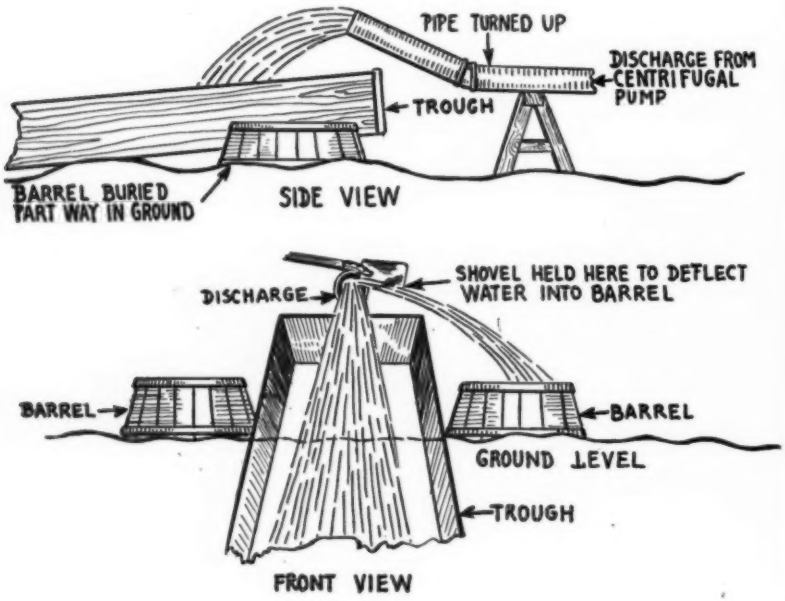
Priming Stunt

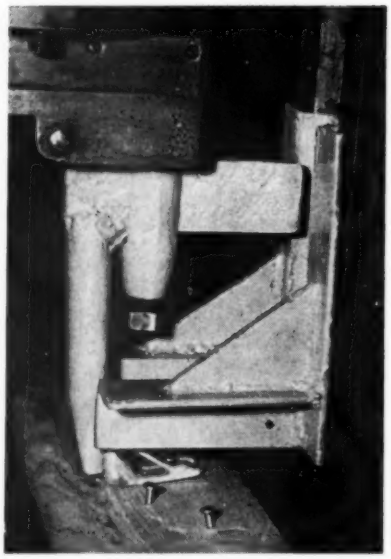
Many times an ordinary centrifugal pump equipped with a foot valve on the suction line is used on construction work. This type of pump has to be primed (filled with water) before it will operate. If there is no water available for priming except that in the hole, the usual method is to use a bucket, and a rope is used to get the water.

If the pump is to remain in one place for some time the arrangement shown in the sketch can be used to provide priming water. The end of the discharge line of the pump is turned up so that water can be poured in by means of a bucket. At either side of the discharge pipe a barrel is placed in the positions shown. A trough directs the flow away from the barrels into a ditch. After the pump is once in operation the barrels can be filled by deflecting a small stream of water into each barrel in turn until they are filled. When the pump is to be started again a bucket can be used to dip the water from these barrels to pour it into the pump line. With an arrangement such as this it is possible for one man to prime the pump and get it started while otherwise at least two men would be necessary.

By K. B. Humphrey

● Below: Sketches showing arrangement of discharge line whereby one man primes and starts a centrifugal pump.





● A close-up view of the business end of the nail-puller showing a piece of salvage lumber being held up to the machine so the extractor claw can catch the backed-out nails and pull them out. *Official U. S. Army Photo.*

Nail-Pulling Machine

Two ingenious nail-pulling machines, made out of scrap materials, are helping an Army Ordnance depot to achieve savings of nearly $275,000 a month in dunnage lumber costs. These devices could be used to great advantage by many contractors.

The nail-pullers were designed and developed by Lt. M. R. Chidakel, assistant maintenance officer at Letterkenny Ordnance Depot at Chambersburg, Pa., who found two discarded shapers, cleaned them, made a few mechanical changes and additions, and turned them into the power tools pictured here. The pullers are saving many back-breaking hours of nail-pulling by hand.

Fifteen women workers are employed by the lumber supply shop to straighten nails and hammer them partially through the wood so that the puller claws can take hold. The machines are powerful enough to pull 40 penny spikes out of heavy oak timbers and make it possible to process 2,000 board feet of lumber an hour. The pullers can extract between 250 and 300 pounds of nails daily.

Inserting Screws in the Dark

The difficulty often encountered of "seeing the slot" in the head of a screw can be overcome by fastening a small flashlight to the shank of a screwdriver as indicated in the accompanying sketch. This handy kink can

be used in the daytime as well as at night and the light accomplishes its purpose very well.

A flashlight can similarly be fastened to an oil can in such position that it lights the end of the spout. This is a great time and oil saver.

W. F. Schaphorst

It's easier to lift, lower, push or pull the Simplex Way!
Simplex
LEVER · SCREW · HYDRAULIC
Jacks
for every construction purpose
Awarded the Gold Medal for Safety
Ask for Catalog 44
Templeton, Kenly & Co., Chicago 44, Ill.

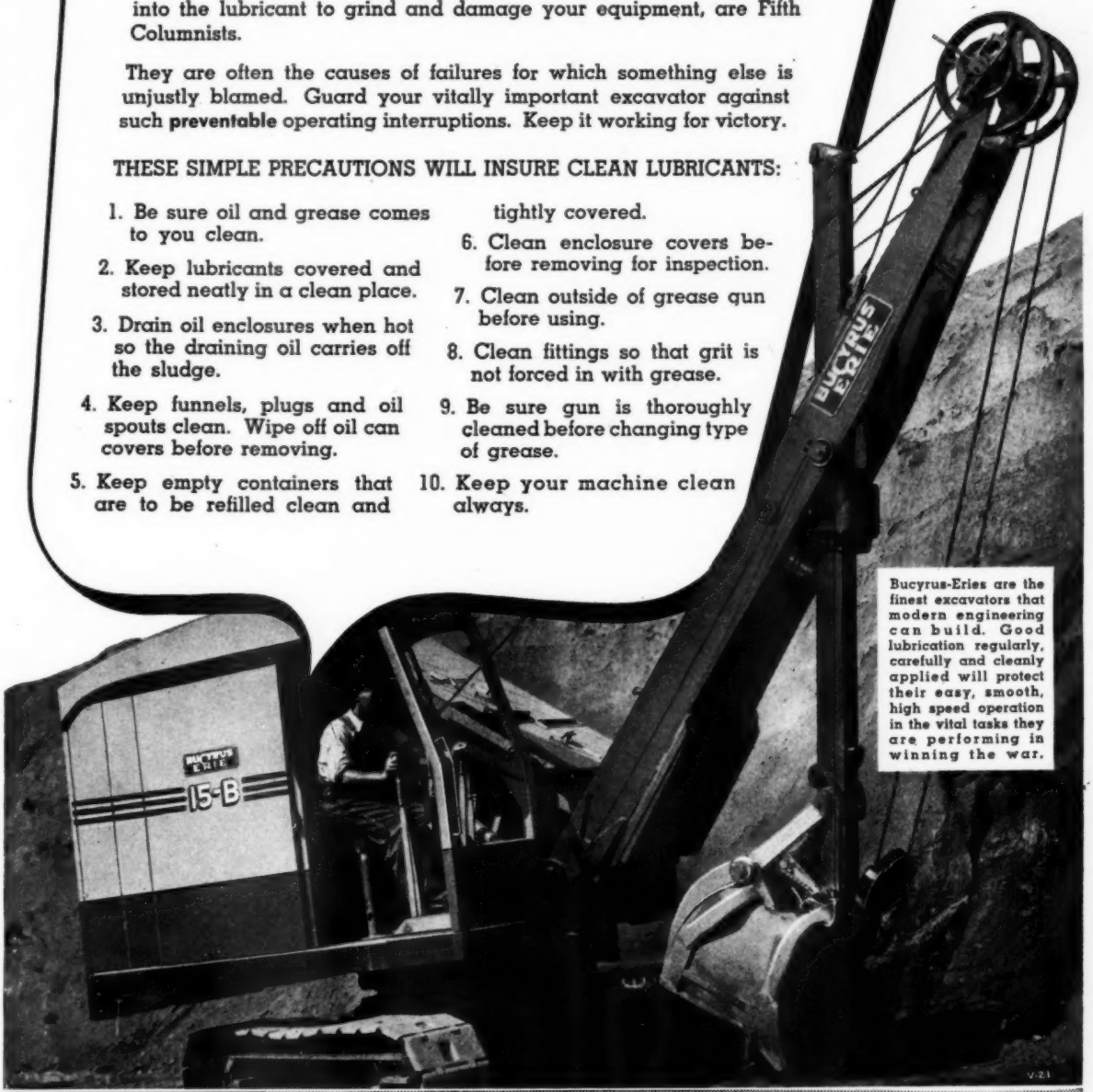
Keep Your Lubricants *Clean!*

Dirt and grit and similar abrasives which are allowed to creep into the lubricant to grind and damage your equipment, are Fifth Columnists.

They are often the causes of failures for which something else is unjustly blamed. Guard your vitally important excavator against such **preventable** operating interruptions. Keep it working for victory.

THESE SIMPLE PRECAUTIONS WILL INSURE CLEAN LUBRICANTS:

1. Be sure oil and grease comes to you clean.
2. Keep lubricants covered and stored neatly in a clean place.
3. Drain oil enclosures when hot so the draining oil carries off the sludge.
4. Keep funnels, plugs and oil spouts clean. Wipe off oil can covers before removing.
5. Keep empty containers that are to be refilled clean and tightly covered.
6. Clean enclosure covers before removing for inspection.
7. Clean outside of grease gun before using.
8. Clean fittings so that grit is not forced in with grease.
9. Be sure gun is thoroughly cleaned before changing type of grease.
10. Keep your machine clean always.



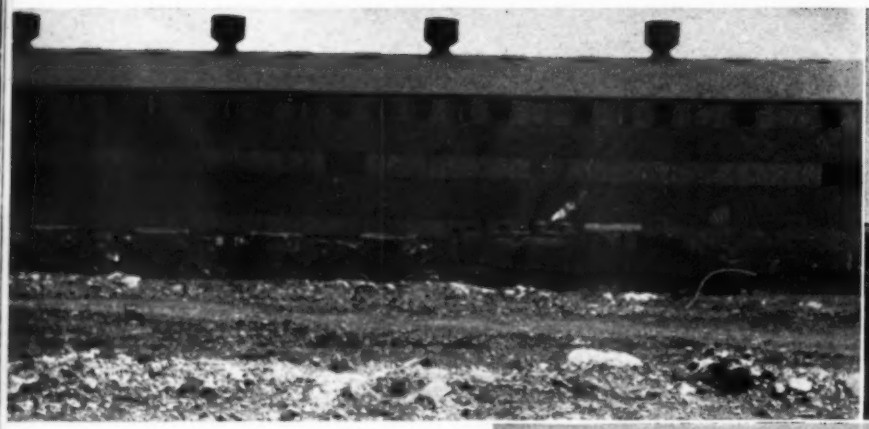
Bucyrus-Eries are the finest excavators that modern engineering can build. Good lubrication regularly, carefully and cleanly applied will protect their easy, smooth, high speed operation in the vital tasks they are performing in winning the war.

V-21

ARMY E ★★ NAVY

Bucyrus-Erie

SOUTH MILWAUKEE, WISCONSIN, U. S. A.



● Ladle cars, loaded with molten blast furnace slag, are pushed by this steam locomotive to the lakeside dump area where they are dumped by the air-compressor car dumper. Upper right: American locomotive crane equipped with clamshell bucket cleans up an ore pile and loads the ore into cars. A similar locomotive crane is used at the open hearth furnace slag pit. Lower right: Private contractor's plant on Inland Steel property near the slag dump where molten blast furnace slag is crushed to make concrete aggregate, railroad ballast and other products.

Slag Disposal . . .

(Continued from page 349)

the tracks with a side pull on the dipper handle after the dipper has been placed against the end of a car. While on stone loading, between the hauling away of filled cars and spotting empties, the B-E casts stone so that only the larger pieces most desirable for use in the furnaces are available. The small pieces of limestone and the powdered material are not used. The railroad tracks for stone and ore loading are kept close to the receding and expanding stockpile by shifting. There are about 1¼ miles of tracks for loading stone and ore to Plant No. 2 and 1¾ miles of track to Plant No. 1.

In spite of the hard, hot material being handled the dippers of shovels used by Inland Steel Company have stood up well under constant use. The 48-B's were equipped with all-cast dippers when purchased by Inland. A new dipper was bought in March, 1941, and although a second extra dipper has been purchased it is still being used as a spare in case of an emergency.

Dipper teeth are made by the Inland Steel Company from manganese bearing steel and teeth are changed every five days. Drawing out and building up the worn teeth with various metals has proved impractical for Inland Steel Company and so the company now scraps the old teeth upon each replacement.

Commercial Use

A private contractor, Daniel J. Varady, has erected a crushing plant on the Inland Steel Company property near the slag dump and he is using some of the molten blast furnace slag to make concrete aggregate, railroad ballast and is shipping some in a crushed form to a cement company that uses it in the manufacture of slag wool, a building insulation material.

Varady's plant consists of electric-powered primary crusher and two conveyors with magnetic separators and diesel powered secondary roll crusher, return and main feed conveyor, shaker screens, and a Lorain 1½-cu. yd. gasoline crawler crane equipped with a clamshell for loading the slag.

It is hoped by Inland Steel Company officials that enough commercial uses will be found for the slag to ease the disposal problem in future years, especially before the present slag disposal area is filled.

Slag disposal operations at the Indiana Harbor Works of Inland Steel Company are under the supervision of H. M. Foreman. His supervision also includes the stockpiling and loading of limestone and ore. Maintenance of all equipment used in this work is in charge of Robert E. Beckwith.

Federal Funds . . .

(Continued from Page 358)

The Bill also designates the 40,000-mile inter-regional highway as the National System of Interstate Highways. Routes to be included in the new system will be selected in the same manner as routes on the regular Federal-aid system, but no separate funds are authorized by the bill for the selected network of highways.

Filed with the committee report was the individual statement of Congressman J. W. Mott of Oregon, long a member of the committee. Congressman Mott declared in part:

"I shall support H. R. 4195 solely for the reason that it is essential that legislation providing for a post-war highway construction program be enacted at this session of the Congress. I feel constrained, however, to state here that the bill, as reported from committee, in my opinion, is wholly inadequate to meet proven postwar highway needs. It is my opinion, further, that there is no sufficient reason or excuse for this inadequacy, because the entire testimony presented at the committee hearings clearly disclosed (1) that the minimum amount required for an adequate postwar highway program would be $1,000,000,000 per year for three years; and (2) that the financing of such a program would be economically feasible and would not result in an undue tax burden on the people who are to benefit by the legislation."

NOT in the *Contract*

Mrs. Jaycee: "Goodness, George, this isn't our baby. It's the wrong carriage."

Mr. Jaycee: "Shut up, this one has rubber tires."

Did you hear the one about the couple, blessed with their first child, who didn't get to the hospital quickly enough and the baby was born on the hospital lawn. The itemized bill was finally received and the careful husband objected strenuously to the item: "Delivery Room, $25.00." He returned the bill for revision. In due time it was returned with the item revised to read: "Green Fees, $25.00."

Colonel (after reviewing troops): "Hang it all. What's the idea of parading all the big men in front of the little men."

Lieut.: "It's the sergeant's fault. He used to run a fruit store."

"Papa," queried the son, "what is the person called who brings you in contact with the spirit world?"

"A bartender, my son," replied the father.

The minister had just finished an excellent chicken dinner. As he looked out of the window, a rooster strutted across the yard.

"My!" said the minister. "That is certainly a proud rooster."

"Yes, sir," said the host, "he has reason to be proud. One of his sons just entered the Ministry."

Two WAVES were en route to California. As their train slowed down, their car stopped opposite an Orange Packing Plant. "Did you ever!" said the first WAVE. "Look at that big sign — 'SUNKISSED NAVELS' . . . must be Hollywood."

Sergeant: "What is the first thing you do when cleaning a rifle?"

Private: "Look at the number."

Sergeant: "What has that to do with it?"

Private: "I want to be sure I'm cleaning my own rifle."

"Why did you leave your last job?"

"Illness."

"What sort of illness?"

"My boss said he got sick of me."

PERSISTENT

An inmate of the lunatic asylum was to be examined for dismissal. The first question he was asked was: "What are you going to do when you get out of here?"

The inmate replied, "I'm going to get me a sling shot and come back and break every damn window in this place."

After another six months in the padded cell, he was again examined, and the same question was put to him.

"Well, I'm going to get a job," was the reply.

"Fine," said the examiner. "And then what?"

"Then I'm going to buy a big car."

"Good."

"And then I'm going to meet a beautiful girl."

"That's wonderful."

"Then I'm going to take her out driving on a lonely road."

"Yes."

"And I'm going to put my arm around the girl."

"Yes."

"Then I'm going to grab her garter, make a sling shot, and come back here and break every damn window in the place."

"Then an explosion tore up main street."

"Goodness! And what did you do?"

"Tore up a side street."

Mother: "What are you reading about, Tommy?"

Tommy: "I don't know."

Mother: "But you were reading out loud."

Tommy: "Yes, but I wasn't listening."

A family with a summer cottage in a Wisconsin wilderness habitually paid the requested price of 50 cents to an Indian for a milk pail brim full of blueberries. But one day last summer he suddenly grunted in protest and upped the price to a dollar.

"Why?" they asked in amazement.

"Hell of a big war some place," was his laconic reply.

Sailor: "Yes, ma'am. That's a man-o'-war."

Lady: "Indeed. And what's the little ship just in front?"

Sailor: "Oh, that's just a tug."

Lady: "Oh yes, of course. A tug-of-war. I've often heard of them."

Doctor: "I can't find any cause for your complaint. I think it's due to drinking."

Patient: "Okay, I'll come back some time when you're sober."

"Who threw them Vitamin pills in the Boiler?"

Quarry Safety . . .

(Continued from page 357)

with a galvanometer, show the entire shot to be all clear. When a shot is hooked up in series, regardless of the number of holes loaded, it will not show clear if there is a single break in any of the wires.

There is no positive method of testing a parallel hook-up that will detect a break or a short circuit. Therefore, a rule that stated blasting circuits should be tested with a galvanometer would be a detriment to the safety cause for quarries using a parallel hook-up.

Toe Hole Drilling

Toe hole drilling is of an unusually hazardous nature and should be reduced to a minimum.

There are three major causes which make toe hole drilling necessary.

First: Failure to clean all burden away from the face before making a primary shot. This is particularly true for the corners.

Second: Trying to shoot too much burden; that is, by drilling well-drill holes too far back from the face.

Third: Failure to drill deep enough below the quarry floor to lift a strata of rock which runs diagonally across the face and dips down below the floor.

Inasmuch as toe hole drilling work is hazardous under the best conditions possible, it seems the most logical safety procedure is to eliminate its necessity. There is no doubt but what, with a little experimenting, the necessity of toe hole drilling can be substantially reduced in all quarries and, in a great many cases, entirely eliminated.

For instance, suppose some toe is found at the quarry face. Instead of drilling it and exposing men to the risk involved, an extra well-drill hole could be drilled in line with the toe and ahead of the regular line of holes near the face. When the primary shot is loaded, only load the bottom of this hole. This will, at least, break up the toe so that the shovel could dig it out when the shot is cleaned up; but in case some of it could not be dug out, it could be drilled in safety, as it would be away from the new face a safe distance for drilling.

Each operator must more or less work out his own method for eliminating toe drilling, as operating conditions vary widely in the various quarries. There is, however, one fact we must admit; that is, whenever we run into a toe condition there is a definite reason for it. This, like all operating problems, if given a little careful study, is not so difficult but what some means of prevention can be found. It will, of course, require some effort on the part of the operating staffs to successfully cope with these conditions.

In conclusion, it might be well to repeat a few good general safety rules that apply to all quarries:

1. The success you attain in improving your safety record is in exact proportion to your success in getting your supervisors to intermingle safety instructions with job instructions.

2. Any set-up for a standard safety practice must be so planned that a minimum amount of work is involved to assure its successful application.

3. Remember there is no such thing as a quarry face made safe.

4. Responsibility for safe practices must be fixed.

5. By suggesting a safety explanation of a safety rule men will do a better job more willingly for they will know exactly why they are doing it.

6. The necessity for dangerous work, such as toe hole drilling, should be reduced to a minimum by eliminating the causes of the dangerous work.

GATKE Brake Blocks and Liners are *CUSTOM-BILT* for all requirements of Cars, Trucks, Tractors, Trailers and Heavy Duty Equipment.

With today's heavy service demands the Extra Performance Qualities of GATKE Brake Blocks *CUSTOM-BILT for the job* are doubly important—

The smooth, non-grabbing action *adds miles to tire life.*

Dependable stopping action under all service conditions *protects equipment* and reduces fatigue of operators.

The long wear life *saves* maintenance time and *keeps 'em rolling without tie-ups for brake adjustments.*

Make this simple test. Use GATKE *CUSTOM-BILT* Brake Blocks for your next five relines and *compare results with the best you have ever had.*

Ask your GATKE Jobber or write for particulars.

Gatke CUSTOM-BILT BRAKE LININGS
BLOCKS SETS ROLLS SHEETS
GATKE CORPORATION 228 N. La Salle Chicago 1, Ill.

TO ADVERTISE: All advertising in this section is payable in advance. Rate: 60c per line, or $7.20 per inch of 12 lines. Minimum charge $2.40. No discounts; no commissions. If no change in copy is desired, three continuous insertions are offered for the price of two. Read these instructions carefully. Each line contains 41 characters (34 characters if all capital letters are used). Count spaces and punctuation as one character each. Allow 10 characters for box number, if blind advertisement is desired. Count your own copy to save delay. Be sure to enclose the correct amount of money with your order. Closing date—15th of preceding month. Example: January issue closes December 15th.

TO INQUIRE: Be sure to address your inquiry to the advertiser by using the correct box number. Mail your letter in care of Excavating Engineer, South Milwaukee, Wisconsin. Write each advertiser a separate letter. Do not write us for name and address of advertiser. This information will not be given out. We have no information about the equipment advertised other than that shown in the advertisements themselves.

MISCELLANEOUS EQUIPT.

FOR SALE

22½-ton rebuilt locomotive crane.
20-ton Brownhoist locomotive crane.
10-ton 4-wheel electric locomotive crane.
100-ft. boom steam whirley.
1-yd. Marion steam crawler shovel.
¾-yd. Blaw-Knox digging bucket.

MACKINTOSH ENGINEERING CO.
2907 Library Ave., Cleveland 9, Ohio

FOR SALE

Blaw-Knox 3¾-cu. yd. clamshell bucket. Heavy duty round nose dredging bucket with alloy scoops, chrome nickel molybdenum steel cutting lips, manganese steel corner bar pins and bushings, and with std. excavating teeth. Lips suitable for different types rock handling teeth. (Blaw-Knox Drawing No. 93080). Size No. 743-2RN, Serial No. AA-1917. Weighs 17,300 lbs. bare. Has seven drop forged chrome nickel steel digging teeth weighing 1,150 lbs. Located in Louisiana. Box 3049

FOR SALE

1½-yd. rebuilt Northwest shovel; 1½-yd. Electric dragline; 1-yd., 3-yd., 4-yd. and 5-yd. Electric shovels; (3) 8-yd. Koehring "Trail Dumps"; Fairleads to fit any 1-yd. dragline; 1-yd., 1¼-yd., and 1½-yd. Page dragline buckets; Trench hoe boom with 1-yd. bucket. A. W. Nevers, 112 North Main Street, Mount Pleasant, Iowa.

FOR SALE

No. 700 P&H Diesel 1½ yd. shovel, ser. No. 3578. New 1930. Good condition. High lift. $6000.

Two Linn-Trac Tractors, 8 cu. yd. Cost orig. $9600 each. New 1943. Good. $2000 each.

M. Wenzel, 2136 Jefferson, Kansas City, Mo.

FOR SALE

Dipper handle, 15-foot, for Bucyrus-Erie Model 1030 or 1035 rope crowd shovel. Brand new. Immediate shipment. Leland Equipment Co., 12 N.W. 13th St., Oklahoma City, Okla.

Building Construction Cost Data

A 48-page booklet with average spot prices on 790 items of Building Construction plus 70 Breakdowns on the more important units. Arranged alphabetically with A to Z Index Tabs. Complete Postpaid $1.60. Address R. S. Means, 2865 S. Buchanan St., Arlington, Virginia.

FOR SALE

Shovel attachment only for P&H Model 204.
Box 3051

FOR SALE

DRAGLINE BUCKETS

2—¾ cu. yd. Type AU Light Weight Dragline Buckets.
1—1 cu. yd. Type AU Light Weight Dragline Bucket.
5—1¼ cu. yd. Type AY Heavy Duty Dragline Buckets.
1—1¼ cu. yd. Type AX Medium Duty Dragline Bucket.
1—3 cu. yd. Type AY Heavy Duty Dragline Bucket (Reconditioned).

BUCYRUS-ERIE COMPANY
Parts Department
South Milwaukee Wisconsin

FOR SALE

WRENCHES

1 with 4½" opening, 3'6" long, very heavy "Williams" like new.
1 3½" opening, 2'10" long heavy "Williams" like new.
1 3½" opening, 2'10" long, all like new. "Williams".
1 3¾" opening, 3'8" long heavy hand forged.
1 3¼" opening, 2'6" long, heavy hand forged.
1 2" opening, 2'8" long, heavy "Williams."
1 2¼" opening, 2'8" long, heavy "Williams."
1 1¾" opening, 16" long, heavy "Williams."
Also a lot of solid pipe dies and stocks up to 3" pipe size.
One 1" Metropolitan injector complete—never unboxed.
One 1 pint Detroit sight feed lubricator, complete—never unboxed.
Several 2½" flue rollers and beaders, hand ratchets and drills.
One factory rebuilt 3" "Kunkle" safety valve.
Box 3047

FOR SALE

One Homelight aluminum 2" portable water pump, weight 90 lbs., gasoline driven, self-priming; with suction hose and connections.

L. F. Brownell, 200 Hill St., Warren, Penn.

SURPLUS DIPPERS FOR BUCYRUS-ERIE SHOVELS

3—⅜ cu. yd. Skipper Scoop Dipper—10-B
2—½ cu. yd. Dragshovel Dipper—17-B
3—½ cu. yd. Skimmer Scoop Dipper—17-B
1—⅝ cu. yd. Inserted Type Dipper—16-B
1—¾ cu. yd. Welded Dipper—21-B
1—1 cu. yd. Dragshovel Dipper—29-B
1—1¼ cu. yd. Cast Front Dipper—GA-3
1—1¼ cu. yd. Inserted Type Dipper—30-B, 42-B, 41-B, 43-B, and E-2.
1—1½ cu. yd. Heavy Duty All Cast Dipper—42-B
1—1½ cu. yd. Welded Dipper—37-B
1—1½ cu. yd. Snow Loading Dipper—10-B
1—2 cu. yd. Rock Dipper—75-B
1—2¼ cu. yd. Inserted Type Dipper—50-B
1—2¼ cu. yd. Inserted Type—55-B
1—2¼ cu. yd. Welded Dipper—48-B
1—2¼ cu. yd. Rock Dipper—75-B
2—2½ cu. yd. All Cast Dipper—55-B
1—2¾ cu. yd. Light Duty Shovel Dipper—54-B
1—3½ cu. yd. Coal Loading Dipper—75-B
1—4 cu. yd. Type IV Med. Duty Dipper—100-B

F.O.B. Works

Write for any further information desired.

BUCYRUS-ERIE COMPANY
Parts Department
South Milwaukee Wisconsin

FOR SALE

Bucyrus E-2 Diesel Dragline Excavator No. 5057, 45' boom, Kohler light plant 3-cylinder Atlas Diesel engine, two (2) lightweight buckets, and approximately $1,000 worth of spare parts. Location, western Kentucky.
Box 3045

FOR SALE

Welding and Cutting Outfits, Torches, Regulators and Gauges, for heavy, medium and light welding and cutting. Superior Oxy-Acetylene Co., Hamilton, Ohio.

FOR SALE

1—1¼ yd. Northwest Combination Shovel and Crane.
1—10 ton, 3 wheel Gas Roller, 1939 Model.
1—1¼ yd. Northwest Shovel Front.
1—¾ yd. Koehring Shovel Front.
1—40 ft. Koehring Crane Boom.
2—160 ft. 2 stage, Portable Compressors.

MERTES MACHINERY COMPANY
1622 So. 1st Street, Milwaukee 4, Wisconsin

FOR SALE

Used McCormick Deering bulldozer tractor model TA 40 serial TAC 1590, 16" track shoes with model CN Continental Trailbuilders No. 180. $1800. Box 3042

FOR SALE

2 shovel type motor-generator sets GE good condition, consisting of AC motor, two DC generators and exciter. Location Midwest.
Box 3050

FOR SALE

Low Bottom Equipment Trailers. One 20-ton 8 wheel semi-trailer. One 40-ton 16 wheel semi-trailer; one rubber tired bulldozer. 422 Chestnut Street, Reading, Pa. Phone 6417

FOR SALE

No. 7 Ross Chain Feeder complete with extra heavy chains, 7½ H.P. 440 volt motor and complete drive. Located near Hibbing, Minn.
Box 3035

SMALL SHOVELS, CRANES AND DRAGLINES UP TO 2½ YDS.

FOR SALE

1 37-B shovel front as taken from 37-B No. 25018
1 20-B shovel front as taken from 22-B No. 20202.
These are in first-class condition and complete—offered for immediate shipment subject to prior sale. Box 3036

FOR SALE

One used model LS-40 speeder combination shovel and dragline, powered with 6 cyl. Waukesha gasoline engine, equipped with 16' boom, 12' handle, ½ cu. yd. dipper together with 28' dragline boom and ⅝ cu. yd. dragline bucket.
Box 3046

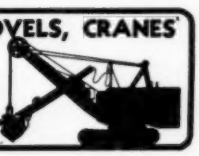
FOR SALE

1—Shovel Front; 1—Back hoe attachment; complete, for Bucyrus-Erie 10-B Dual Rope Crowd Shovel. Available for immediate shipment, no priority. Located in Ga. Box 3048

FOR SALE

Diesel shovel equipment, complete set for 50-B. Includes 2-yd. dipper, boom, dipper handle, crowd machinery, two sets teeth. Good condition. Located in Kentucky. $2400 f.o.b. Box 3040

LARGE SHOVELS, CRANES AND DRAGLINES 2½ YDS. AND UP



FOR SALE

Class 14 Bucyrus steam dragline shop No. 811, 65' boom, mounted on skids and rollers, boiler inspected 125 lbs. pressure year 1942. Located Eastern Nebraska. Priced reasonable. Box 3039

FOR SALE

3T Monighan Dragline No. 407 modernized to compare with 3W, 70' boom, 10' extension, 3½ yd. dragline bucket. Fairbanks Morse diesel engine, Ward Leonard electric swing. Available now. Located state of Washington. Box 3034

FOR SALE OR RENT

1—80-B Bucyrus steam shovel, Serial No. 4020, 45' Boom, 28' Stick, 2½ yard bucket. Good operating condition, location western Kentucky, will strip 22' overburden. Tel. 3-5581, P.O. Box 21, Montgomery 1, Alabama.

WANTED!

15—20 to 30 cu. yd. Dump Cars, drop-door type

IRON & STEEL PRODUCTS, Inc.

39 years' experience

13474 S. Brainard Ave., Chicago 33, Ill.

"ANYTHING containing IRON or STEEL"

WANTED

Late model 3-W Bucyrus-Monighan dragline with Ward-Leonard control. Will pay cash. Box 3033

WANTED

10-B shovel preferably with crane attachment. J. C. Campbell Co., 413 W. Michigan St., Duluth, Minn.

WANTED

Half Yard Shovel

Crawler type, gasoline

Must be in good condition

KENTUCKY CLAY MINING COMPANY

Mayfield, Ky.

WANTED

2 or 2½ or 3 yard stripping shovel, Diesel or Electric, long reach, must be first class condition, preferably located Ohio or vicinity. D-7 Caterpillar Tractor with bulldozer or angledozer. First class condition or rebuilt and guaranteed.

Eastern Clay Products, Inc., Eifort, Ohio

WANTED

Bucyrus-Erie 20-B Shovel. Box 3041

WANTED TO BUY

Pile Driver leads, hammer and cap for Manitowoc Speed Crane with 55' boom. Box 3043

WANTED

Used or new 1½-2 ton Gasoline Tandem Roller. Box 3037

WANTED

⅜ to 1 yd. Shovels or Cranes, Tractors and Front End Loaders, Bulldozers.

MERTES MACHINERY COMPANY

1622 So. 1st St., Milwaukee 4, Wisconsin

WANTED

¾-yd. shovel; 1½ to 2-yd. crane or dragline. Rent or buy. Box 3044

WANTED
Help, Positions

Address all box numbers
c/o EXCAVATING ENGINEER
South Milwaukee, Wis.

WANTED

Man capable of managing parts service station for construction machinery parts; preferably one with similar previous experience. Knowledge of excavating machinery desirable. Box 9229

OPERATORS WANTED

Experienced operators wanted for 320-B Bucyrus-Erie Steam Shovel in open pit coal mine. Steady work. Fall Brook Coal Company, Antrim, Tioga County, Pennsylvania.

Shovel and Crane Operator

About 45 years' experience on steam, gas, and electric shovels on coal stripping, railroad, state road and quarry work. Married. Willing to go anywhere. Able to make own repairs. Now located in Pa. Box 9228

ALL-AROUND OPERATOR

Can operate any kind of shovel, dragline, crane or clamshell—steam, diesel, gas or electric. Can do own repair work. Experienced in quarry, ore and coal stripping. Prefer quarry or coal stripping. Familiar with grading work. Will go anywhere. Box 9226

Notes from the manufacturers

Caterpillar Tractor Co., Peoria, Ill., announces the addition to the "Caterpillar" line of a wide range of sizes and types of earthmoving machines, including bulldozers, scrapers, rippers and cable control units, to become effective at such future times as military requirements make possible. The new program is partial departure from "Caterpillar's" past practice of relying upon other manufacturers to produce all of the numerous items of machines and equipment that can be powered by "Caterpillar"-built tractors. William Blackie and William J. McBrian have been made vice-Presidents of Caterpillar Tractor Co., it has been announced by President L. B. Neumiller following a meeting of the Board of Directors.

R. G. LeTourneau, Inc. of Peoria, Ill., announces 15 more distributors under the company's exclusive distributors' policy. The new list, which brings the total number of LeTourneau distributors to date to 29, are: Hunter Tractor and Machinery Co., Milwaukee; Dempster Bros., Inc., Knoxville, Tenn.; The Crook Co., Los Angeles; Contractors Machinery Company, Grand Rapids, Mich.; J. E. Ingram Co., San Antonio, Texas; Pillipi-Murphy Co., Minneapolis; Pacific Hoist and Derrick Co., Seattle, Wash.; Florida Equipment Companies of Jacksonville, Tampa and Miami; Cyril J. Burke, Detroit; Phillips Machinery Co., Richmond, Va.; Contractors Equipment and Supply Co., Atlanta; Landes Engineering Company, Salt Lake City, Gibson-Stewart Co., Cleveland, and Conley-Lott-Nichols, Dallas, Texas, and Rozier-Ryan Co., of St. Louis.

American Chain and Cable Company, Inc., Bridgeport, Conn., announces the appointment of Frank W. Bemis as sales manager of the American Cable and Hazard Wire Rope Division with headquarters at 230 Park Avenue, New York. Mr. Bemis has been with the company since 1938.

Truckstell Manufacturing Co. of Cleveland, Ohio, was incorporated as a stockholder distributor organization consisting of approximately 40 national distributors of truck equipment.

New trade literature

Title: "Are the United States United?"

Subject: Third edition of booklet which shows how the hundreds of laws which restrict and hamper the movement of goods between the states mean higher costs of doing business and higher costs of living. This booklet brings up to date the latest information available on the movement toward elimination of trade barriers and the adoption of uniform minimum standards for sizes and weights of trucks and trailers.

Where to Get: Fruehauf Trailer Company, Detroit, Mich. (Free)

Title: "A Contribution for the Future"

Subject: A well-illustrated story of the Iowa Manufacturing Company plant, home of "Cedarapids" crushing and screening plants, asphalt plants and material handling equipment. Production and use of equipment is included in this illustrated story of the company's 25 years.

Where to Get: Iowa Manufacturing Company, Cedar Rapids, Iowa (Free)

Title: "Map of District Number Seven"

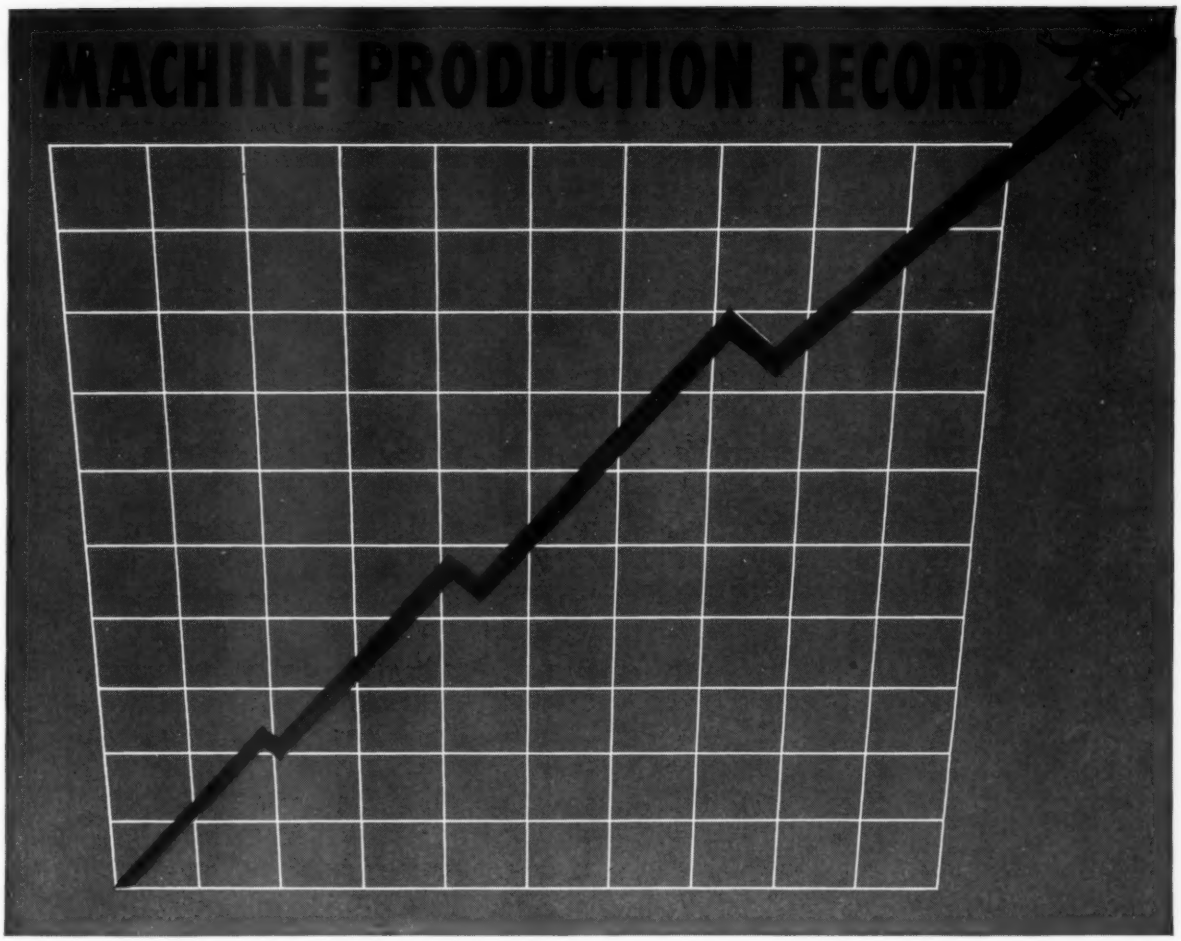
Subject: A new authentic and complete map of District No. 7 (Southern Low Volatile), showing the location of each mine, outline of sub-districts and with indices.

Where to Get: National Coal Publications, Berger Bldg., Pittsburgh, Pa. (Prices ranging from $7.50 to $25.00)

Title: "Three Wheel Road Rollers"

Subject: New bulletin on the uses, production and specifications of Galion road rollers.

Where to Get: The Galion Iron Works and Mfg. Co., Galion, Ohio.



JOE SWITCHED TO TRU-LAY PREFORMED WIRE ROPE!!

(Yes — it increases machine production)

AMERICAN CABLE DIVISION

Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, Portland, San Francisco, Tacoma

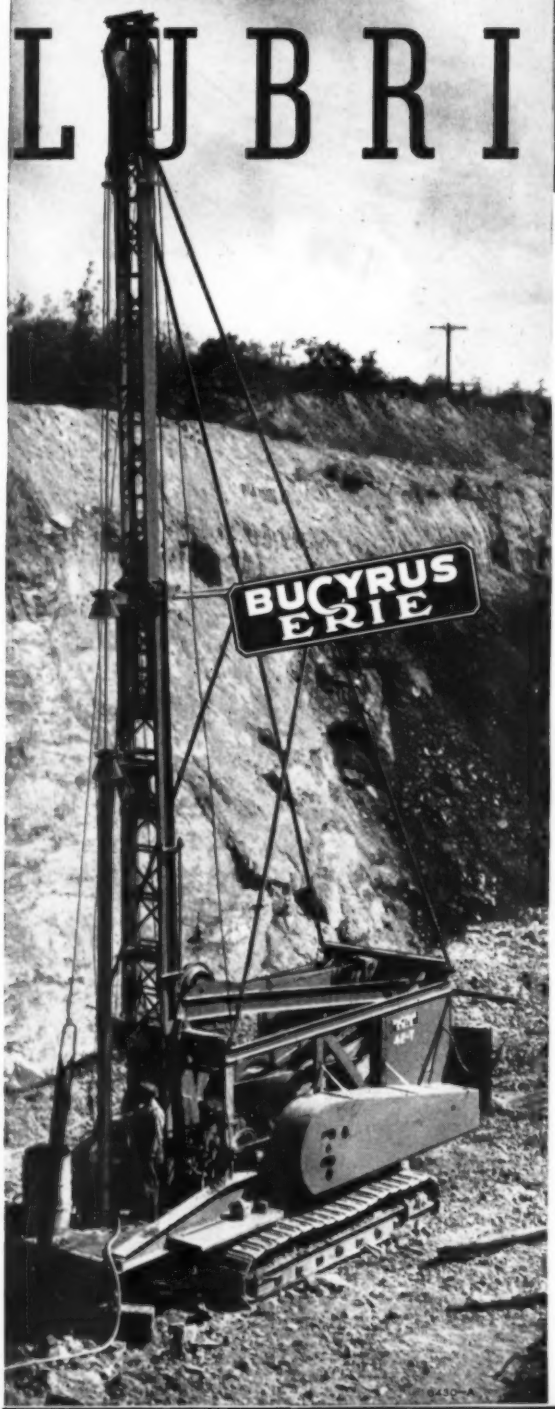
AMERICAN CHAIN & CABLE COMPANY, Inc.

BRIDGEPORT • CONNECTICUT

ESSENTIAL PRODUCTS...TRU-LAY Aircraft, Automotive, and Industrial Controls, TRU-LOC Aircraft Terminals, AMERICAN CABLE Wire Rope, TRU-STOP Brakes, AMERICAN Chain, WEED Tire Chains, ACCO Malleable Castings, CAMPBELL Cutting Machines, FORD Hoists, Trolleys, HAZARD Wire Rope, MANLEY Auto Service Equipment, MARYLAND Bolts and Nuts, OWEN Springs, PAGE Fence, Shaped Wire, Welding Wire, READING-PRATT & CADY Valves, READING Steel Castings, WRIGHT Hoists, Cranes . . . *In Business for Your Safety*

Your Blast Hole Drill Needs

LUBRICATION



to last the duration!

You can do much to help your blast-hole drill endure the war years — while it's working its hardest and best — by lubricating it regularly. Be sure to follow carefully the complete lubrication instructions of your drill manufacturer, and you'll be well on your way to drilling as Uncle Sam likes it — at top speed for the duration.

Here Are Some Points to Watch:

- Bearings on crown sheave and sand line sheave should be lubricated once each shift.
- On modern machines lubricate ball or roller bearings on jackshaft and engine pulley shaft with small amounts about once each week. Don't use graphite grease. On older machines with plain bearings, lubricate daily.
- If your machine is caterpillar-mounted, lubricate crawler fittings once each week, oftener when machine is propelling long distances. Even when your drill is not travelling, keep cats lubricated against wearing motion developed in drilling.
- Keep wire lines lubricated with wire rope lubricant to prolong their life.
- Be sure to lubricate spudding pinion and bull reel pinion once each shift.
- Don't overlook sand reel shaft bearings and operating lever connections — they should be lubricated once each shift.
- Get complete lubrication instructions from your drill manufacturer and follow them carefully.

Keep 'em Drilling

H-46C

ARMY E NAVY

Bucyrus-Erie

SOUTH MILWAUKEE, WISCONSIN, U. S. A.